AMERICAN
DYESTUFF REPORTER

• DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY •
BLEACHING • DYEING • FINISHING • PRINTING •

VOLUME XX | OCTOBER 12, 1931 | NUMBER 20

LIBRARY
BUREAU OF CHEMISTRY
RECEIVED
OCT 16 1931
DEPARTMENT OF AGRICULTURE

LIBRARY
RECEIVED
OCT 1 1931
U. S. Department of Agriculture

for—

those popular reddish-browns

the new, straight Erio Fast Brown 5 R L is suggested by Geigy for fall and winter woolens and unweighted silk.

Strictly a piece-dye color, it is level dyeing in the extreme and fast to light — splendid as a self shade or in combinations.

Print shops will be pleased with the results on wool challe and silk crepe.

DYESTUFF MAKERS · GEIGY · SINCE 1858 ·
Established 1764

GEIGY COMPANY INC.— NEW YORK

Sole Selling Agents in U. S. & Canada for J. R. Geigy S. A., Basle

Boston *Portland, Ore.* *Philadelphia* *Cincinnati*
Columbus, Ga. *Providence* *Toronto* *Charlotte, N. C.*

In Great Britain—The Geigy Colour Co., Ltd.
National Buildings, Parsonage, Manchester.

OFFICIAL PUBLICATION OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

GOOD WILL PROFITS

In the manufacture and sale of textiles there are two essential profits, a good will profit and a money profit. One is dependent on the other, cannot exist long without the other.

The most important messengers of good will are the fabrics. They go out in a constant stream, here, there, everywhere, to be inspected and tried by many eyes and many hands—to make friends or not. Fabrics speak for themselves by appearance and the service they render, making or losing good will.

It is essential to the continued growth of our business that each formula we compound for each mill we serve shall do its part to create good will for them, so that we and our customers may continually receive two profits—the most important of which is good will.

ARKANSAS COMPANY · INC·

233 BROADWAY **NEW YORK**

MANUFACTURERS OF TEXTILE CHEMICALS

American Dyestuff Reporter, Vol. XX, No. 20, October 12, 1931. Publi-shed Bi-Weekly by Howes Publishing Co., Inc., 440 Fourth Ave., New York, N. Y. Domestic subscription, $5.00; Canadian, $5.50; foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the Act of March 3, 1879. Copyrighted 1931, by Howes Publishing Co.

Contents of This Issue

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

October 12, 1931

The Processing of Cellulose Acetate Rayon 647
By D. M. Gilmore

Metallic Salts of the Free Acid of Orange II 671
By Neil E. Gordon, George Seidel, B. W. Allan, and C. M. Loane

Proceedings of the American Association of Textile Chemists and Colorists

Calendar of Coming Events (277) 653, (291) 667

Meeting of South Central Section...(277) 653

September Meeting, New York Section .....(277) 653

The Laundryowners' Problems in Relation to the Dyer and Finisher...(278) 654
A Paper by George H. Johnson

Rayon Identification—Tentative Report of Rayon Sub-Committee....(286) 662

Applicants for Membership.....(292) 668

Editorial:

Wage Cutting 669

PENETRATION AND CONTROL IN THIS ASSISTANT

ESCOLLOID, by its remarkable colloidal-alkaline action, furnishes the most speedy, safe and efficient kier boil ever known. For the dyer it provides thoro and even wetting of goods in the dye bath and peptization of the dye, thus assuring perfect distribution and uniform absorption of the dyestuff.

ESCOLLOID is a double-duty detergent, so powerful that it penetrates the heaviest pieces and quickly emulsifies all foreign matter, yet so controlled that its action has no harsh effect upon the goods.

Consider the possibilities of this modern assistant in your plant. Write for information on ESCOLLOID and its uses.

THE COWLES DETERGENT COMPANY
7016 EUCLID AVENUE · CLEVELAND, OHIO
Southern Distributor—ROBT. G. BARR, Greenville, S. C., P. O. Box 1557

ESCOLLOID
COLLOIDAL ALKALI FOR KIER BOILING AND DYEING

When dissolved, this new substance makes a solution having physico-chemical properties entirely unlike any common alkali. Greater in penetration, more thoro in circulation thru the goods, powerful in dispersing dyestuff thru the solution, this new colloidal-alkali opens new possibilities for the Dyer who wants to produce exceptional dyeing effects.

© CDC

NATIONAL CARBANTHRENE DYES

SUPERIOR VAT COLORS

FOR DYEING NATIONAL CARBANTHRENE

Black B Double Paste

Blue GCD Double Paste
Blue BCS Double Paste
Blue RCS Double Paste
Dark Blue DR Paste

Violet 2R Paste

Yellow G Double Paste

Golden Orange G Paste
Golden Orange RRT Double Paste

FOR PRINTING NATIONAL CARBANTHRENE

Printing Blue GCD Double Paste
Printing Blue BCL Double Paste
Printing Dark Blue DR Paste

Printing Violet 2R Paste

Printing Yellow G Double Paste

NATIONAL ANILINE & CHEMICAL COMPANY, Inc.
40 RECTOR STREET NEW YORK, N. Y.

BOSTON - - - - - - - - - - 150 Causeway St.
PROVIDENCE - - - - - - 15 Westminster St.
CHICAGO - - - - - - - - - 357 W. Erie St.
PHILADELPHIA - - - - - 200-204 S. Front St.
CHARLOTTE - - - - - - 201-203 W. First St.
SAN FRANCISCO - - - - - 145 Second St.
TORONTO - - - 137-145 Wellington St., West

NATIONAL DYES

AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Published by Howes Publishing Company, 440 Fourth Avenue, New York

Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOLUME XX **OCTOBER 12, 1931** **NUMBER 20**

The Processing of Cellulose Acetate Rayon

By **D. M. GILMORE**

Previously cellulose acetate rayon amounted to only about 5% of the total rayon output. This figure has been raised so that it is now closer to 8%. The finishing of this material has formerly been passed over to a few who have had the time and funds to expend on the necessary research. But now, with the increased output, there is more general interest in the problems of the processing of cellulose acetate rayon.

FOR a number of years acetate rayon occupied a somewhat arbitrary position in this country among piece goods finishers who, not altogether successful with the new product, allowed the finishing of this material to pass into the hands of a select few who had both the time and funds to expend on the research necessary, to carry the new fabrics through to success.

This state of affairs was more or less satisfactory as long as the production of cellulose acetate rayon accounted for about five percent of the world's output of rayon only, but, on account of the cellulose ester proving peculiarly adaptable to certain types of fabric, the consumption of cellulose acetate rayon is now probably close to eight percent.

Incidentally, it may be considered safe to state that this increase of sixty percent, in the world's proportionate demand for cellulose acetate rayon, is largely due to the widespread recognition and consequent application of the unique properties of the comparatively new filament in this country. Cellulose acetate rayon has not attained this success merely by the elimination of a less fortunate or inferior rival but by the creation of new standards of quality. The writer refers particularly to lining materials in which one of the attributes must be a tendency to avoid catching or plucking on less frictionless surfaces such as those of the wearer's hands or other garments.

Properties of Cellulose Acetate

Cellulose acetate rayon possesses a softness and smoothness of handle or slipperiness possessed by no other filament or fibre and, in consequence, is eminently suitable for the lining of sleeves (even where other parts of the garment, not so exposed, are lined otherwise). It also finds extensive application in the lining of men's outer garments, which may be considered to undergo undue wear and tear in the constant putting-on and taking off particularly during the summer months.

Another vital property which must be possessed by lining materials is that of withstanding repeated exposure to perspiration, both with regard to color and filament.

It has been established that cellulose acetate rayon resists the action of dilute acids somewhat better than other rayons, due, probably, to its power of resisting the absorption of aqueous solutions. In like manner, and for the same reason, cellulose acetate rayon has less tendency to shrink during its intermittent exposure to perspiration. Furthermore, a comprehensive range of colors has been evolved, which consists largely of nothing more nor less than highly dispersed vat colors, and which possess the latter's superlative resistance to all types of perspiration without the normal vat colors' difficulty of application to the regenerated cellulose rayons.

As a large proportion of all lining materials are dyed with aniline black and there has been difficulty in obtaining blacks on cellulose acetate rayon which compared with aniline black in fastness to light, washing, perspiration, it is interesting to note that A. J. Hall's E.P. 322,893 covers a method for the successful application of aniline black to cellulose acetate rayon.

Newcomers in the field of finishing cellulose acetate rayon fabrics are spared the former drawbacks of this filament and its dyestuffs, in that filling barriness and phototropism, once almost insuperable difficulties respectively, are now permanently banished and millions of yards of cellulose acetate rayon fabrics are processed annually without trace of either of the above mentioned troubles.

General Processing

Generally speaking, cellulose acetate rayon is sized with gelatine,soluble starch, etc., and contains one or more plasticers of a water- insoluble nature. Consequently it

is necessary to give an initial cold water treatment to swell the gelatine prior to its complete removal during the scour proper.

The scouring medium should always contain a small amount of a solvent such as a high-boiling member of the benzol series (xylene for instance), which has no solvent action on the cellulose acetate rayon itself but effectively dissolves the plasticisers.

With few exceptions (namely voiles and the lighter crepes, which are dyed in the rope form), cellulose acetate rayon fabrics should be processed in the open width.

Example of Staining

With reference to cellulose acetate rayon goods in the grey, the writer once encountered a peculiar case of staining which no amount of ordinary scouring would remove. Even temperatures in excess of those recommended for the preservation of the full luster of the filament failed to remove the stain. The grey goods, having a cotton warp and cellulose acetate rayon filling, had been allowed to lie in the folded state (more or less covered with sheeting), in a grey room in which regular cotton fabrics were being brushed, inspected, etc. After a period of about eighteen months each lap of the goods in question had acquired a dirty streak across the full width of the material and which was the more noticeable after bleaching or dyeing certain shades such as pinks and tans.

Scouring with the assistance of various otherwise efficient solvents was of no avail and finally it was found that nothing but several ends on a jig through a fairly concentrated solution of a scouring agent of the turkey red oil—solvent type, followed by shelling-up overnight and a thorough scouring the next day, would suffice to remove the stain which consisted of nothing more than starch, sizing materials in general, and a little black oil, absorbed by the cellulose acetate rayon.

The foregoing is illustrated simply to indicate that the time factor is of relatively great importance in processing cellulose acetate rayon. Needless to say, all fabrics containing this latter filament were stored in rolls thereafter.

Pad Dyeing

If the newcomer to cellulose acetate rayon will remember that this material is slow to wet-out completely and that it becomes somewhat plastic in aqueous solution, at temperatures in the neighborhood of 180°F., he will be in a position to solve many of his process problems.

The first of these phenomena is also responsible for the failure to pad-dye cellulose acetate rayon satisfactorily, though it has been attempted with more or less success for tints and very light shades. Generally speaking, however, pad-dyeings of cellulose acetate rayon, which must be confined to tints and very light shades if uneven results are to be avoided, are merely stained, in which case the shade is of inferior fastness to light, washing and perspiration.

The addition of a swelling agent such as alcohol, acetic acid, xylene, etc., in a suitable form assists the levelling of pad-dyeings.

Use of the Jig

As the processing of practically all cellulose acetate rayon lining fabrics such as satins, taffetas, twills, failles, etc., both sheer and in association with the regenerated cellulose rayons, must be carried out in the open width, the jig is the natural remedy and a few words regarding its essential features will be appropriate at this stage.

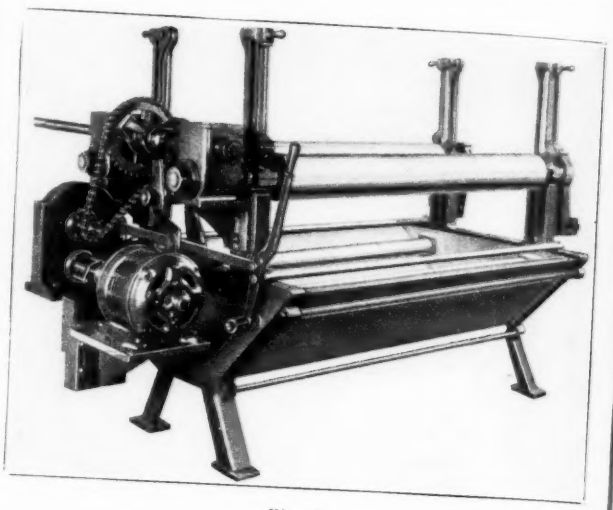


Fig. 1

Being one of the oldest and most frequently used machines in bleaching and dyeing plants, the mechanical condition of the majority of jigs is not always all that could be desired for this type of work.

Equipment which may be satisfactory for direct or even vat colors on cotton may be useless for processing cellulose acetate rayon. Jigs suitable for handling this material should be accurate and light running and should possess some means of fabric-control thereby ensuring absence of warp tension and the formation of creases and slack or tight selvedges, the most fruitful sources of faulty work with this type of fabric. Ball and roller-bearings both in the transmission and for the draw roller journals will ensure smooth and light running, sufficient even for the satisfactory processing of the lightest of these lining materials.

An objectionable feature of the normal type of jig is the variable speed of the fabric through the dye liquor, due to the speed of the draw rollers varying with their respective diameters, which in turn, vary with the quantity of material on the draw rollers. Whilst this variable speed may be overcome by winding to and fro additional super-imposed batching rollers, such practice is a prolific source of creases, which are further aggravated by the combined weight of the batching roller and fabric pressing down on the fabric wound round the the draw roller.

In addition, this procedure retards the normal speed of the jig considerably. The tendency in Europe is to fit some kind of automatic device which permits the speed of the draw roller to compensate for the ever-increasing

diameter of the batch and so ensure a constant traverse speed of the fabric through the dye liquor.

Fig. 1. Illustrates an extremely smooth and light running jig, fitted with ball and roller bearings throughout, manufactured by the Morrison Machine Company.

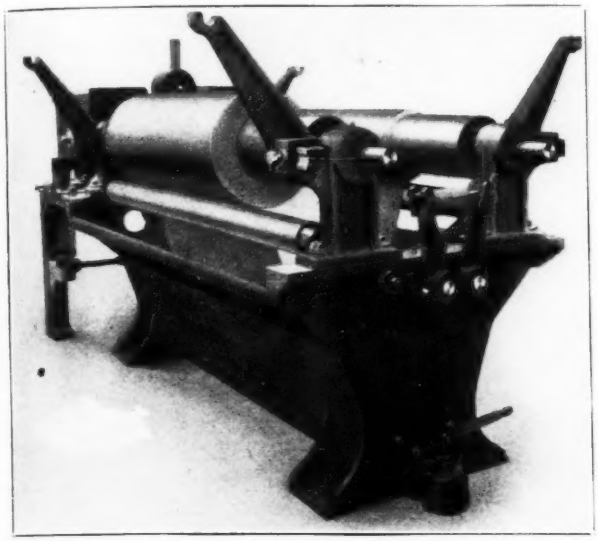


Fig. 2

Fig. 2. Illustrates a machine, furnished throughout with ball and roller bearings, and including an automatic device for ensuring constant fabric speeds, made by Taylor Bros., of Castleton, England.

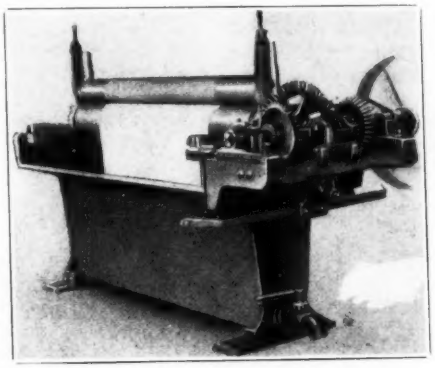


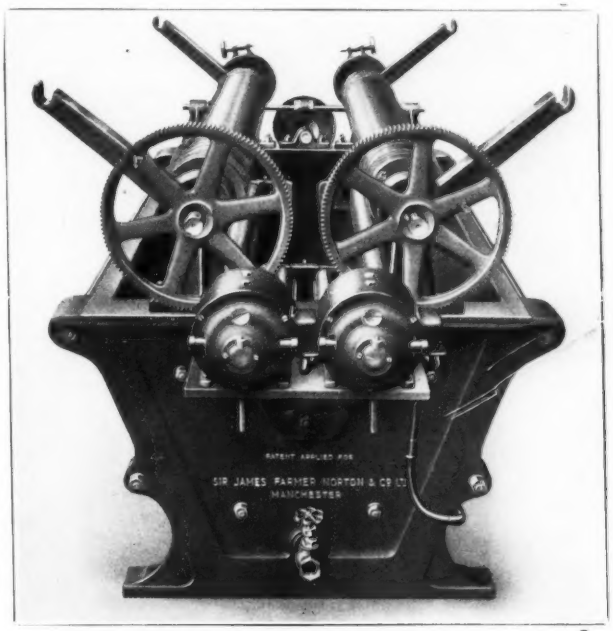
Fig. 3

Fig. 3. This type of jig has been recently introduced mainly for very light fabrics, it being claimed that a minimum of warp tension is exerted on the fabric and that the tendency to cause distortion or bowing of the weft is entirely overcome. As there is only one draw-roller the traverse speed of the fabric must of necessity be constant. In addition the single immersion roller is carried in self-aligning bearings so that material in motion will always adjust itself parallel to the single draw-roller, thereby minimizing the tendency to crease longitudinally. An additional feature of this novel type of jig is the automatic breaking. This machine is manufactured by S. Walker & Sons, Radcliffe, England.

Figures 4 and 5 illustrate a new patent automatic jigger, which is being built at the present time by Rice, Barton and Fales at Worcester, Mass. It embodies the following features:

Constant Cloth speed
Tensionless cloth control
Automatic reversal
Automatic setting for any predetermined number of reversals
No shafting or belts required
No snatch on reversal
Existing Dye Jiggers converted at low cost.

Fig. 6. Illustrates a reel machine.



Built by Rice, Barton and Fales Co., Worcester, Mass.
Fig. 4

Whilst, at first sight, shrinkage may not appear to be of first importance in plain lining fabrics yet for the lining of men's garments in particular, it is essential that the material be fully shrunk before being cut up. Subsequent shrinkage will have a tendency to cause the hem of the garment to assume an unsightly curl. Hence the necessity for avoiding as far as possible, all warp and filling tension during processing. For this reason curved expanders are not recommended for jigs handling this type of fabric.

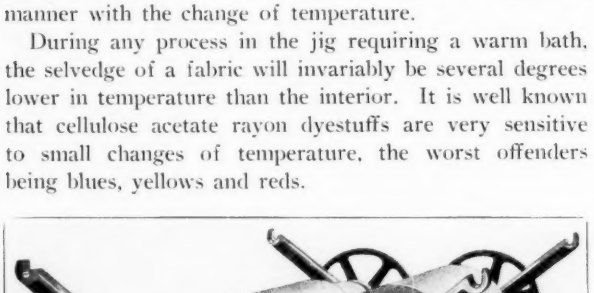
An additional argument in favor of eliminating warp tension is the fact that fibres or filaments under tension do not absorb as much dyestuff as those which are slack and in consequence there would be, in sheer fabrics, a distinct appearance of warp stripiness. In general, jig speeds for cellulose acetate rayon fabrics should not exceed 50 yards per minute.

Dye Absorption

As mentioned previously, cellulose acetate rayon absorbs dyestuffs comparatively slowly with the result that

certain medium and heavy shades require as much as 8-10 hours for dyeing. Frequently this is the indirect cause of heavy selvedges or selvedges of a slightly different shade than the body of the material. Assuming the jig and batch of material to be perfect mechanically (the batch should have a knife edge), stained selvedges are caused by inefficient scouring and subsequent rinsing and the use of dyestuffs, each of whose affinities varies in a different manner with the change of temperature.

During any process in the jig requiring a warm bath, the selvedge of a fabric will invariably be several degrees lower in temperature than the interior. It is well known that cellulose acetate rayon dyestuffs are very sensitive to small changes of temperature, the worst offenders being blues, yellows and reds.



Built by Rice, Barton and Fales Co., Worcester, Mass.
Fig. 5

Essentially, those dyestuffs should be selected whose affinities vary uniformly with change of temperature.

Similarly, as it is always more difficult to rinse out the last traces of a scouring liquor from the selvedge than from the interior unless the rinsing is thorough, this trace of scouring liquor, generally containing a small percentage of a swelling agent, will cause the selvedge to assume a slightly darker shade than the rest of the fabric.

As previously explained, with sheer cellulose acetate rayon fabrics, the scouring liquor is required to remove only gelatine (already pre-treated with cold water), and a small amount of one or more plasticisers. Consequently, after removal of the gelatine, very little soap is required to remove the fugitive color, dirt, etc., accumulated during weaving, and the inclusion of an emulsified solvent in the soap solution will remove the water-insoluble plasticisers.

With regard to the soap used, this will depend on the water available, for, just as cellulose acetate rayon is difficult to wet-out, so it is equally difficult to remove substances such as calcium and magnesium soaps which have been produced on or in the filaments. Residual calcium and magnesium soaps besides causing cloudy dyeings also give rise to "chalkiness" which is the formation of a greyish-white line, very similar to a faint chalk mark, when the fabric is sharply scored with the finger nail. Such a fabric would be expected to develop similar marks during cutting up.

Scouring Liquor

Where soft water is available a good green olive soap is recommended and the scouring liquor should consist of something of the nature of the following:

2 gm. per liter Olive oil soap
0.5 gm. per liter Soda ash.
0.25 gm. per liter Emulsified solvent.

With water of a doubtful nature the soap should be replaced by one of the sulphonated castor oils, which prevent the precipitation and coagulation of calcium soaps, and in which is dissolved the requisite amount of solvent. It is recommended to use the perforated pipe system (connected to a hot water main), of washing as this method gives a more efficient rinsing of the fabric in a given period. A further advantage of this system is that the material is continually brought in contact with absolutely fresh water.

Luster is also a determining factor in the scouring of these goods and, as all methods of delustering subsequent to dyeing have a tendency to sadden the shades, it is necessary to perform this operation in a permanent manner prior to dyeing as it is much easier to dye a delustered fabric to shade than to deluster a dyed fabric to shade. Before actually scouring and delustering cellulose acetate rayon satins, taffetas etc., it is recommended to give them a passage through a fairly concentrated solution of turkey red oil, containing one of the high-boiling benzene homologues or any of the harmless swelling agents.

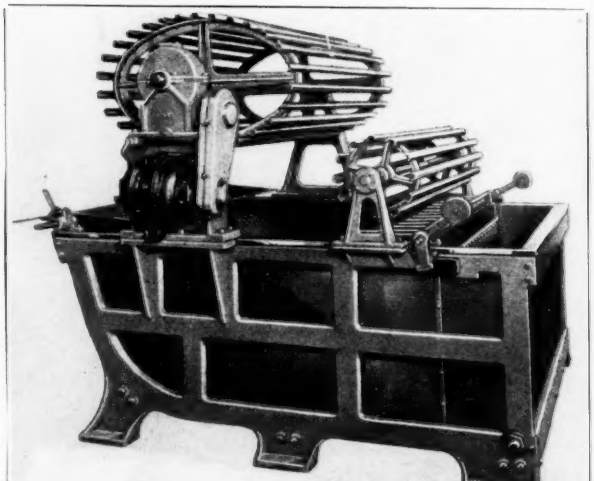


Fig. 6

Where possible the goods should be shelled up overnight. Scouring is continued by running the fabric, still impregnated with the turkey red oil and swelling agent,

through a very dilute solution of soda ash in water, to which a small amount of olive oil soap may be added. The degree of luster is greatly dependent on the mechanical condition of the jig. The writer has known cases where excessive tension has made it impossible to deluster cellulose acetate rayon in a soap bath, even at the boil. It has been established that a pH of about 10.5 gives the optimum delustering effect with a soap solution only.

Frequently this procedure has a tendency to saponify the cellulose ester, though with sheer goods this is of practically no disadvantage, but with mixed fabrics, both plain and crepe etc., it may give rise to certain difficulties in the cross-dyeing of bright shades. In order to reduce this tendency to saponify, about 0.25% of phenol or similar swelling agent may be added to the soap.

The temperature should be maintained as close to 100° C. as possible (impossible on the jig or winch), consequently it will take longer to deluster on either of these machines than if the goods were suspended in regular boil-off tubs.

By using phenol, cresol etc. the pH may be lowered to about 8.5 and the operation should take about half an hour or two ends on the jig.

Of course, by varying the temperature of the bath different degrees of luster may be obtained, within limits. For instance, if the delustering operation is carried on for too long a period the luster will gradually return.

After dyeing (regarding which much has appeared in current literature and on which it is not proposed to enlarge in this article), the goods should be rinsed thoroughly and care taken to see that the fabric is quite cold and that the batch is not too tightly wound.

Drying and Extraction

Failure to observe these two precautions frequently results in "water-marking" and the same remarks apply when using an open width, centrifugal type hydroextractor. Generally speaking however it is more convenient to pass the fabric over a vacuum suction extractor, attached to the entering end of a 90' tenter. This slotted tube device ensures even extraction without including an extra operation and furthermore the fabric is under constant supervision throughout.

For sheer cellulose acetate rayon fabrics it is recommended to omit passing them over the usual stack of five drying cans as it is essential, in order to obtain as soft a finish as possible, that all tension on the tenter be eliminated.

Special Processes

Certain heavy shades requiring prolonged dyeing periods will undoubtedly require a little assistance to render them as soft as the lighter shades. This may be accomplished by passing the fabric, after extraction, through a brass and rubber mangle containing the requisite amount of olive oil emulsion, etc. Should the finish still not be as soft as desired the fabric may be given one nip, no weight, through a calender followed by a light breaking on the button breaker. However if all the precautions mentioned have been carried out there will very rarely arise the need for this final operation and it will be found that it is in fact desirable to finish sheer cellulose acetate rayon fabrics off the tenter.

Mixtures of the cellulose ester and the regenerated cellulose are passed over the stack of 5 cans (where the latter filaments are in the warp) and on account of the harsher handle of the regenerated cellulose filaments, calendering and breaking are frequently resorted to. A phase in the finishing of cellulose acetate rayon lining fabrics wherein the finisher is expected to overcome certain shortcomings in sections of the cutting-up trade, is the demand for iron-proofing. Iron-proofing at the best can only increase the temperature, at which cellulose acetate rayon becomes brittle and finally melts, by some 30 degrees Centigrade.

However this finish is undoubtedly called for and may be accomplished in two ways. The first has the disadvantage of delustering the fabric considerably and consists in precipitating tannate of tin in the filaments. In addition the fabric is rendered somewhat harsh by this treatment.

The popular method involves a superficial saponification of the cellulose acetate rayon by means of caustic soda before dyeing. The method consists in padding the goods through about 12-13 tw. caustic soda at 120° F, with or without the addition of about 2 per cent of a swelling agent such as alcohol, etc. The padder is run in series with a stack or stacks of cans as it is preferable to dry saponified cellulose acetate rayon immediately after impregnation with the caustic soda.

Regarding the processing of these lining fabrics in general, as these materials are usually expensive and involve considerable time and money for finishing, a little extra care expended on the sewing, etc., of seams and leaders will pay for itself many times over. Leaders should, where possible, consist of a piece of cellulose acetate rayon as the use of cotton may give rise to shaded ends due to the cotton picking up color, and having no affinity for it, transferring it to the cellulose acetate rayon.

Crepe Fabrics

With crepe fabrics the stumbling block is the control of creping and the elimination of dyebreaks and creases. Methods have followed those generally accepted for the processing of natural silk namely that of "stringing" and creping, scouring, etc. in the regular boil-off tubs or dye becks.

However, due to the comparatively short time required for scouring cellulose acetate rayon there has been a tendency to substitute less tedious methods some of which are giving satisfactory results and others the reverse.

The writer has known cases where the bale of grey goods has been opened and the pile divided into three sections, covered in the cold scouring liquor in the winch and left overnight. The following morning the material was strung over the winch, the bath warmed up and scouring and dyeing carried out as usual. While this method was satisfactory with the better constructions, it could hardly be called successful with the lower ones.

A method which gave good results with all types of

fabric consisted in padding the grey goods at 140°F with a ten per cent solution of turkey red oil containing a swelling agent such as alcohol, xylene, etc. in solution and plaiting down on an open truck. After ¾ hr. the goods were transferred to the winch and scoured and dyed as usual. A modification of this method consists in padding the fabric with a solution similar to the above and, whilst still in the open width, picking it up on an endless net (such as is used in the crepe drier), and spray-washing with hot water. The fabric is then scoured and dyed as usual.

According to the nature of the crepe required the method of creping varies. As might be expected from experience with all-rayon crepes, temperature plays an important part in the fullness of the crepe and also in the "pebble." By commencing to scour at low temperatures and gradually raising to about 180°F, a soft handle is combined with a flat crepe and full luster.

By raising the temperature about 180°F, and according to methods mentioned before, the cellulose acetate rayon may be delustered to the desired extent.

As is frequently the case particularly for print goods, an enhanced "pebble" is required. This may be brought about by commencing to crepe at high temperatures but extreme care must be exercised, otherwise dyebreaks, creases and cracks will abound. The method involving the combined use of a padder and spray-washer (as mentioned previously) is particularly recommended for processing cellulose acetate rayon crepes of low construction, so as to obtain the maximum "pebble". No matter what temperature is employed in the creping and scouring of these goods, this should not be exceeded in any subsequent process or there may be a tendency for the crepe filament to shrink further and cause dyebreaks, etc.

After dyeing, which is the least arduous of all operations undergone by this fabric, the material should be partially dried over the suction extractor, any other method is liable to lead to creases or "watermarks", and dried on the crepe net drier.

It is recommended to add such softeners, if any, as may seem desirable, for instance, olive oil emulsion, sulphonated olive oil, glycerol, etc. either during the last rinse after dyeing or, in the interests of economy, in the quetch in front of the crepe drier.

The fabric is then steamed and tentered to width over the short tenter. In conjunction with the flat crepe finish the fabric is frequently finished off the Palmer machine. The main troubles with this type of fabric are mostly some form or other of creases.

If these are of a non-permanent nature or "soft" they may be removed by tentering once or twice or by running up through a jig, containing a swelling agent in concentrated solution, and allowing to stand several hours on the shell. After washing out the swelling agent the goods may be finished in the regular way when all "soft" creases will have been removed.

Other Fabrics

Tubular knitted fabrics present very few difficulties in the way of creases, etc. and may be scoured and dyed in the reel.

Warp knitted goods are somewhat more difficult to process than the above in that they are very susceptible to creasing if loaded directly into the reel. If some preparatory treatment such as padding or shelling up through a swelling agent such as turkey red oil and solvent (as previously mentioned), is performed, scouring and dyeing may proceed without difficulty. The lighter fabrics such as voiles, ninons, etc., offer further difficulties of penetration on account of their high-twist yarns. Frequently the fabric is impregnated with a hot concentrated solution of one of the swelling agents referred to in the mangle and run over the 90′ tenter or just padded in the liquor and plaited down.

These methods have the advantage in using concentrated solutions of the swelling agent to which cellulose acetate rayon undoubtedly responds. Other methods rely on stringing the fabric by the selvedge in a regular boil-off vat.

Dyeing may be carried out in the same machine or if the size of the lot will not allow of this, on the grounds of economy, it may be performed on the reel or winch. After extracting on the suction extractor, voiles and ninons are finished on the tenter calender and breaker.

Thickness Gage for Fabrics

A gage has been developed for measuring the thickness of carpets during tests on the carpet wear machine at the Bureau of Standards of the Department of Commerce. The Bureau of Standards believes that the gage will be found suitable for measuring the thickness of other fabrics, since it provides a ready means of measuring thickness under an extremely small known load and under a series of different loads. Thus a measure of the softness or hardness of the fabric can be obtained. The recovery after the application of a load for any period of time can also be determined readily with this gage and thus the "compressive elasticity" can be evaluated.

Further information regarding this thickness gage may be obtained by communicating with the Bureau of Standards direct.

Takes Booth

Mr. H. C. Meegan, Miss D. L. Potter and Mr. D. S. Collard, members of the staff of the National Oil Products Company of Harrison, N. J., will represent that company at the Silk Machinery Exposition to be held in Paterson, November 14 to 21. The National Oil Products Company has taken a booth at the Exposition, and will have a technical exhibit, to illustrate the various uses of their industrial oils as pertain to the silk industry.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
P. J. Wood
Oriental Silk Printing Co., Paterson, N. J.

Vice-Presidents
William H. Cady—H. A. Barnes

Treasurer
Harry R. Davies

Secretary
Alex Morrison
American Woolen Co., Andover, Mass.

Councilors
Ralph F. Culver — George A. Moran
H. M. Chase — Hugh Christison
William R. Moorhouse — Walter M. Scott

President Emeritus and Chairman of the Research Committee
Louis A. Olney
Lowell Textile Institute, Lowell, Mass.

Local Sections and Their Officers

Northern New England Section—
Henry D. Grimes, Chairman, Wood Worsted Mills, Lawrence, Mass.
Harold C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Rhode Island Section—
Dr. D. H. Powers, Chairman, U. S. Finishing Co., 389 Charles St., Providence, R. I.
A. Newton Graves, Secretary, Franklin Process Co., Providence, R. I.

New York Section—
Robert H. Gaede, Chairman, Gaede Silk Dyeing Co., Paterson, N. J.
Clemens F. Hoppe, Secretary, Oriental Silk Printing Co., Haledon, N. J.

Philadelphia Section—
Charles A. Seibert, Chairman, 311 S. Riverside Walk, Penn's Grove, N. J.
Percival Theel, Secretary, Philadelphia Textile School, Philadelphia, Pa.

Piedmont Section—
Samuel L. Hayes, Chairman, Hartsville Print & Dye Works, Hartsville, S. C.
Arthur R. Thompson, Jr., Secretary, North Carolina Finishing Co., Salisbury, N. C.

South-Central Section—
R. S. Wheeler, Chairman, Crystal Springs Bleachery, Chickamauga, Georgia.
J. D. Mosheim, Secretary, Crystal Springs Bleachery, Chickamauga, Ga.

Midwest Section—
Edward W. Morgan, Chairman, Morgan Dyeing & Bleaching Co., Rochelle, Ill.
William Bergh, Jr., Secretary, Vassar Swiss Underwear Co., Chicago, Ill.

Lowell Textile Junior Section—
Alfred J. Carbone, Chairman; Paul Duggan, Secretary.

North Carolina State College Junior Section—
R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

CALENDAR OF COMING EVENTS

Annual Meeting
December 4, 5—Boston.

* * *

MEETING OF SOUTH CENTRAL SECTION

The South Central Section of the A.A.T.C.C. met at the Signal Mountain Hotel for a social meeting on August 29, 1931. A brief business session preceded the entertainment, opening with the reading of the minutes and the Treasurer's report. There followed a momentary pause in the proceedings, in memory of Mr. L. L. Okey, deceased. Following this, the announcement of the organization of a new section in Columbus, Ga., was made, and the Secretary was instructed to send a letter of greeting and good wishes for their success. Mr. Andrew Kelly was appointed to take the late Mr. Okey's place on the Sectional Committee. It was decided to hold the next meeting at the Read House with Vice-Chairman Noel D. White in complete charge of arrangements. The business meeting adjourned and a most enjoyable social evening followed.

Respectfully submitted,
J. D. Mosheim,
Secretary.

SEPTEMBER MEETING NEW YORK SECTION

The September Meeting of the New York Section of the American Association of Textile Chemists and Colorists convened at the Chemists' Club, 52 East 41st Street, New York City, Fraiday evening, September 25, 1931, at eight-fifteen o'clock, Mr. Robert H. Gaede, Chairman of the Section, presiding.

Following the routine business of the Section, Chairman Gaede made this announcement:

Chairman Gaede: I regret to announce the sudden death yesterday morning of one of our members, Mr. E. F. Lotte. Mr. Lotte was one of the charter members of our Association, a past Chairman of the New York Section, and a member of the Research Committee.

Let us rise and stand with bowed heads for one minute.

The members arose and stood in silence for one minute as a tribute to the memory of Mr. Lotte.

Chairman Gaede: Mr. Freedman has outlined the intentions of the Program Committee and we are starting off tonight with two people to pick on us. First we will hear from Mr. Johnson who is Director of the Department of Research of the Laundryowners National Association. Mr. Johnson's talk will be on "The Laundryowners' Problems in Relation to the Dyer and Finisher.

Mr. Johnson! (Applause).

Proceedings of the American Association of Textile Chemists and Colorists

The Laundryowners' Problems In Relation to the Dyer and Finisher

By **GEORGE H. JOHNSON**

(Director, Department of Research, Laundryowners National Association of the United States and Canada)

MR. CHAIRMAN, Ladies, and Gentlemen: I have been asked to cover a rather broad field in such a brief time, and with your indulgence I think I will confine my remarks almost entirely to color fastness.

Mr. Freedman suggested that I also include the subject of shrinkage as we have observed it in the laundry industry but I don't think we have time to do that without crowding the program. I don't want to take any time away from Mr. Trimble.

Tonight I should like to have you consider color fastness from just a slightly different angle. It is true you are familiar with color fastness in terms of color cards as obtained from various dyestuff concerns. Probably many of you have conducted color fastness tests under laboratory conditions with Launderometers or other methods of testing but I should like to make the suggestion that tests of that type be further substantiated by actual tests under actual conditions of performance.

When the average bundle comes to a commercial laundry—and this is true whether this bundle comes to our laundries or is handled at home by the housewife herself—that bundle has to be segregated in what we term various classifications. That has to be done, for various reasons.

In the first place the laundry operator has learned from experience that he absolutely has to handle his white work—and when I say "white work" I mean chiefly cotton and linen—separately from his colors.

He has learned, secondly, that he cannot handle wool with the same washing method that he uses for the handling of cotton.

He knows, furthermore, from experience that he cannot handle silks and rayons by the same general type of formula which he might apply to a cotton load.

Therefore he has to consider the properties of the fibers themselves, so that you will find that the major classifications of a laundry in terms of fibers are the following:

Cotton and linen will be handled together.

Wool will be handled separately as a rule.

Silk and rayon will be handled together. As far as laundries are concerned silks and rayons are one and the same thing.

With the entry of color into the picture we have a somewhat more complicated problem. As far as the laundryowner again is concerned he has no way of telling, when he obtains a garment from a customer, whether it is fast dyed or not. Therefore the only thing that he can do to protect himself and protect his patron's goods is to segregate those materials according to color and as I get along a little further in my discussion or classification I think you will see what I mean by that. But, in brief, he puts certain classifications together because from experience he knows that they have to be handled together.

The following are the minimum requirements for good classification in a commercial laundry and I am going to enlarge on these a little later so you can become a bit more familiar with the ways in which your merchandise will be handled in the laundry—and again I will repeat a good many of these recommendations apply just as much to home washing as to commercial laundry methods:

The first will be a separation of white work. Some plants you will find will separate that into white flat work and white wearing apparel, for convenience in the plants. But that is your main segregation of white goods.

Then there is a classification known as fast colors, colors for example with quite a bit of white area, with a certain amount of color, the fastness again of which the laundry operator knows nothing about. He receives thousands of pieces. Therefore he handles them in certain separate classifications.

Then he has his so-called light colors including his pearls, tans, oranges, his Nile greens, etc. These he subdivides. Some plants handle them together, but for best results they are handled separately. By that I mean the pinks or colors containing red, orange, or yellow are handled in one separation; those containing greys, blues, greens, lavenders are handled in another separation. The washing methods as you will see a little later are identical. The main reason for making the separation is to avoid having the greys and bleeding colors dull the lighter shades such as tans and oranges.

That makes four separations then as a beginning.

Then we have our dark colors. I am speaking now almost entirely of cotton. We have our dark colors including seal browns, navies, dark greens, blacks, etc.

When we come to silks and rayons—remember as I

said a moment ago, silks and rayons as far as the laundry is concerned receive identical treatment—they are subdivided into a light color classification and a dark color classification, again to avoid the possibility of having the lighter shades dulled by bleeding of the darker colors.

The wools are also divided into a light and dark classification, again for the same reason, and handled separately, I might add.

Thus you see the laundryowner has his problems of dividing materials in certain segregations so they can be properly handled in the plant, not only from the point of view of the consumer but from the point of view of operations in the plant.

In addition to all these separations the plant catering to the finished family bundle has others to consider.

From the viewpoint of plant convenience you will find that laundries are handling shirts usually separately divided into a white classification and a colored shirt classification.

Collars usually are handled separately.

Overalls or working clothing make still another separation.

Then we get into the classification which is known as "commercial flat work." That is hotel flat work, butchers' aprons, doctors' and dentists' coats, and so on, all forming various classifications.

The reason I am stressing this, gentlemen, is to try to impress upon you the fact that it isn't possible for a laundry to get by with mixing colors and whites. It can't be done from the viewpoint of convenience. It can't be done from the viewpoint of the quality of the bundle, as far as the customer is concerned. Laundries are absolutely forced to make these separations, and, believe me, with the way in which color is coming into the flat work separation it becomes somewhat of a problem at times.

I am not going to take up your time by telling you what constitutes a white washing formula because we are not particularly interested in that at the present time. Suffice it to say that in modern handling of work in laundries we have what is known as a multiple suds washing formula. This consists of a series of three to five short suds, ten minutes in duration as a rule, followed by from four to five five-minute rinses with water, the last bath of which is a souring operation with acetic acid or some of the silica fluoride or acid fluoride types of sours, and a bluing operation.

That in brief constitutes a washing formula for the handling of white work. I might add that in the fourth bath generally, the last suds, that is, the laundry owner adds what you folks term bleach, what we in our industry call Javelle water. I might point out that the concentration of that Javelle water in a well-operated plant is one one-hundredth of one per cent in terms of hypochloride. I might also point out that at a temperature of 150 degrees Fahrenheit, 85 per cent of that hypochloride is consumed within the first three minutes of time and that 90 per cent is taken care of within five minutes.

Then, in the handling of fast colors, what is the main reason for fast color separation, bearing in mind that that includes fabrics containing a large quantity of white and a small amount of color?

The main reason of course is to handle that at as high a washing temperature as will clean the white areas. At the same time no laundry owner can take a chance on handling that classification with his whites for fear of the effect upon the colored areas themselves. Therefore a compromise is effected and we have what is known as a fast color separation handled at a temperature of around 140 degrees Fahrenheit with soap and alkali alone.

Those of you producing cotton prints with white areas have that condition to face, a temperature of 140 degrees, soap, with a concentration in the wash wheel of about a tenth of a per cent, and an alkali concentration depending on the type used of about a half of the soap or a third of the soap concentration.

Colored shirts are handled with a formula almost identical with the fast color formula, for the reason that in spite of the fact we may have solid shades—powder blues, and so on—nevertheless we have a condition of soil to consider. In other words, the requirement of the laundry is not only color fastness but it is a bundle returned to the customer that satisfies her, that is a clean bundle. Shirts come to the laundry with badly soiled cuffs, with badly soiled collars and neckbands to be cleaned. That means that they cannot be laundered at a temperature of 100 degrees Fahrenheit as would normally be used for what we term our "light fugitives," but instead we have to use higher washing temperatures in the vicinity of 140. So that the remarks I have applied to fast colors apply also to colored shirts.

With regard to fugitive colors—and let me add that fugitive colors (so there will be no misunderstanding) include a light pink classification, a light blue classification, and a dark color classification, all handled separately—the washing formula for all three of those classifications may be the same, but because of the fact that there is bleeding of colors which the laundryowner has to protect himself against he must handle those things separately. Therefore, he has those three separations, washed by the same method.

The temperature for your light color classification does not, in good practice, exceed 100 degrees Fahrenheit. Your soap concentration again is one-tenth of a per cent, and the reason that is true is because of the construction of the wash wheel itself. Those of you who are familiar with some of your hosiery dyeing equipment, with the revolving cylinder inside of a shell holding the

liquor, have a pretty good idea of what constitutes a laundry washer. It consists merely of an outside shell of metal or wood. The interior contains a cylinder holding the clothes which revolves around and around, the ribs lifting up the clothes and dropping them back into the sudsy liquor. That in brief constitutes a washing machine.

So that, as far as your light color fugitives, and even your darks are concerned, your highest washing temperature is about 100 degrees Fahrenheit.

I might add that, particularly in the case of dark fugitives, many plants have come to the practice of handling them with cold water generally, for the temperature of the tap water is generally in the vicinity of 60 degrees Fahrenheit.

With regard to hosiery, hosiery in the well-operated plant is divided into two classifications, a light colored and a dark colored classification, again washed separately but by the same general process. Just as short a washing formula is used as will properly clean that material, bearing in mind that the feet of stockings can sometimes be badly soiled. That usually means a break of five or ten minutes. That is the first operation, which is followed by one or two ten-minute suds and three or four rinses. The number of rinses used will depend pretty much upon the size of the load. If we have a small-sized load in the washer we don't need as many rinses to properly remove the soap, and take care of the dirt as we would in a machine that is properly loaded.

So there again your fastness requirements as far as washing is concerned are not particularly serious.

With regard to the handling of silks and rayons (silks and rayons in the commercial plant as I have said before are handled together), they are split again into a light color classification and a dark color classification to avoid the bleeding of colors. The highest temperature used would be 90 to 95 degrees Fahrenheit. Almost without exception, nothing would be used except a neutral soap. That will be either an olive oil soap or, if it is used in liquid form, it can be a tallow soap which is commonly used for the handling of high temperature work.

In the case of wool, I think our industry has gradually awakened to the fact that special wool washing equipment is required, equipment which will avoid any possibility of felting—so much so that you have seen in recent years the development of special blanket washing equipment. And in that connection I think you will be interested in the following incident:

At the North Carolina meeting in Asheville last May, Mr. Thurman Chatham, of the Chatham Manufacturing Company, was on the program, and this is the policy he outlined to those laundryowners in convention: He said, "Gentlemen, when we bring out a new blanket we immediately send it to the American Institute of Laundering where that blanket is tested under actual operating conditions. If that blanket meets with the approval of those at the American Institute of Laundering we place it on sale. If we find that that blanket has been mishandled we immediately go to the laundry and ask him why that was the case."

In other words, the thing works both ways. By cooperating with that type of mill, we have gotten to the point where I believe laundryowners today recognize the fact that blankets and woolens absolutely require special handling and special conditions and frequently special equipment.

That is an indication of how the laundry industry can cooperate. You would be surprised at the amount of that that is going on behind the scenes that we aren't even permitted to talk about.

As to the work clothing classification, what you commonly think of as overalls—there was a time when about the only shades encountered in overalls was khaki, navy blue (probably dyed with indigo), and of course the white overall so commonly used by painters. But style has come into work clothing as it has into all other phases of our industry and we find mode shades now being used, such as tans, sandalwoods, Nile greens, and so on, even in work clothing.

Unfortunately, as far as the laundry owner is concerned, he has a condition again of soil to consider. That type of material, regardless of the shade, comes to laundries covered with paint and grease necessitating high temperature washing. So that as far as work clothing is concerned, regardless of whether it is dyed a dark shade or a light shade, it normally has to be handled with a formula very similar to that used in the handling of white work with the exception that hypochloride solutions would not be used. In other words, we would use a series of short suds at temperatures probably as high as 150 to 160 degrees Fahrenheit, followed by hot rinsing. That is required in order to remove the type of soil that is present on that class of material.

Awnings are another requirement facing the laundry owner. As far as the laundry industry is concerned the washing problem should not be serious, for this reason: that your main requirement there is light fastness, fastness to light, and weather conditions. Awnings probably don't come to a plant more than once in six months to be laundered. It is doubtful if an awning receives more than three or four washings in its whole life. Therefore, your first requirement of course is fastness to light. So far as awnings are concerned, the washing temperature would be in the vicinity of 140 degrees Fahrenheit, with soap and the various alkalines. These alkalines I might mention include sodium carbonate or soda ash, sodium meta-silycate which have been coming into use particularly in recent years, trisodium phosphate, sodium sesquicar-

bonate, or the modified sodas, and in a few plants caustic soda in liquid form.

A word about color and bleach: Laundries are accused of using bleach on colors and in many plants which are not properly operated that criticism probably is sound, but I am speaking now of the well-operated plant, and I am trying to call attention to classifications containing color which are very likely to come in contact with hypochloride solutions. They include such materials as striped towels, where you have a border or a woven stripe and where the balance of the material is absolutely white. They also include sheetings largely white with the exception of colored borders. The same of course would be true of pillow slips. They would include tablecloths and napkins with colored borders where the majority of the fabric is white. Aside from that general classification the well-operated plant does not apply hypochloride solutions to colors.

Summing up these requirements, these are the main ones to bear in mind when you stop to consider color fastness from the viewpoint of the consumer:

That with the exception of the bordered materials that I have just mentioned the highest temperature used in good plants under good operating conditions is in the vicinity of 140 degrees Fahrenheit with soap and alkali.

In the case of solid shade materials such as would be encountered in wash suits or dresses, aprons, and materials of that type, the highest temperature encountered will be in the neighborhood of 100 degrees Fahrenheit.

In work clothing, because of the condition of soil that is encountered, a temperature as high as 160 degrees Fahrenheit has to be used.

Dark colors would be handled at temperatures varying between cold water, or approximately 60 degrees Fahrenheit, and 100 degrees.

Silks and rayons would be handled at a temperature not exceeding 95 degrees Fahrenheit.

Colored woolens would be handled at a temperature again not exceeding 95 to 100 degrees Fahrenheit.

I think you will see from that that the fastness requirements are not particularly stringent, and yet as a matter of fact we have some very interesting specimens come to our laboratories relative to color fastness. And right here let me say this: that one of the chief causes of color failure I believe to be friction.

We had a very good example of that come to us from a manufacturer; a Hoover apron, badly faded originally, had been a deep shade of green. Tearing open the hem, the inside of the color was just as good as the original sent with it. The interior of that fabric received just as much a cencentration of solution as the outside but it did not receive the effect of friction.

We have seen instances time and again where a beaker test alone was not the answer. I believe your Launderometer test, which I understand has been adopted by your Association, is a step in the right direction because there you are taking into account the fact that there is such a thing as friction. And it will be surprising too, gentlemen, how much color is removed with friction in the first washing. There is a surprising amount of surface color eliminated in the first washing largely because of the combined effect of friction. In other words, the effect of concentration of supplies does not begin to compare in most cases with the effect of the rubbing action received in a laundry washer or at home in a housewife's washing machine.

So much then for color requirements as they are likely to be encountered in the laundry industry.

Now then, what are some of the color difficulties which we encounter and face?

One I think can be grouped under this title: the unwise choice of color for intended use.

I think if people realized the way in which the material was to be used after it was dyed or printed, fastness requirements might be a little more stringent.

I recall one case which I think is in point of a flat dot print which was sent to our laboratories some two years ago for test by a manufacturer. It was on a voile. That material was laundered as a woolen, laundered with a colored load at low temperature. It was laundered with a load of white work at high temperature. We found that regardless of how that material was handled the dot merely rubbed away, disintegrated, and the beauty of the fabric was lost.

We reported to the mill in question that in our opinion the fabric was not washable. It is our understanding that the mill so reported to the converting house. It also is our understanding that over our objections and advice that material was placed on the market and I have it on quite reliable authority that between them those two houses split quite a nice loss.

In other words, I believe it would pay your industry to cooperate with what has been entitled the maintenance division of your own textile industry, that is, the dry cleaning group or the laundry group, and work out with them some of your color fastness requirements. There is a vast difference, gentlemen, between a laboratory test alone and a performance test.

A second difficulty we encounter which probably goes back to the cutter-up is mixing of colored lots and incorporating them into the same article at the time of tailoring.

For example we will receive a shirt, launder it in the usual way, and one sleeve will be badly faded and the balance of the garment will launder perfectly. That, gentlemen, can mean only one thing. I believe that you will all agree with me that as far as washing is concerned when a garment is in a soap solution or a soap and alkali solution the concentration is the same upon all parts of the garment. There is no reason for a washing process singling out for attack portions of that garment unless there

is some reason for it and the reason generally will go right back to the fact that the cutter-up has mixed his lots, possibly dyed at two different times, or by two different concerns, and has fast color in one case and a fugitive color in the other.

A third difficulty we encounter is from fugitive trimmings. White materials for example may be trimmed with an edging of some type or a sewing thread, buttonhole stitching, and cause difficulty because of the fact that the dyer didn't realize how that material was going to be used. As a matter of fact if we receive a white garment in the laundry containing only a very small amount of colored trimming there is nothing for us to do but to handle that material with the whites because the customer wants a white article returned to her. In other words if you are producing trimmings, by all means consider a white work washing formula when you consider your fastness requirements.

A well-known damage we are all familiar with is our old friend Sulphur Black which we occasionally encounter in cotton hosiery, also occasionally in black ginghams, shirtings, and materials of that type, where the black yarns will simply wash out and rub away because of having been tendered for reasons that you well understand.

Another difficulty which we sometimes encounter is in white materials containing a colored border. Occasionally it will be found that the colored yarns will be tender, the result being that they will simply rub out or disintegrate, and there will be a claim for a laundryowner to face. In a case of that sort, again I wish to call attention to the fact that as far as washing is concerned, the colored yarns received identical treatment with the white yarns adjacent to them.

I recall one case where we took out the individual white yarns themselves and found breaking strengths in terms of about two and a half pounds per yard, whereas the colored yarns which had given trouble broke in terms of ounces. Either redyed yarns or materials which had been tendered in some way in processing had been incorporated with strong yarns in the same fabric, the result being that the colored yarns rubbed and wore away.

A difficulty which we find occasionally which goes back to the printing operation perhaps occurs in the case of discharge prints where the discharge areas will rub out and disintegrate because of having been weakened or tendered. Again, remember the washing process wouldn't attack the discharged area, that was weak and tender before it ever came inside the laundry washer.

Another difficulty in the handling of prints is in a fast printed design on a developed ground. I understand some plants have been in the habit of advertising such material as guaranteed colors. As a matter of fact such a color in our estimation is not a guaranteed color, because a developed color will not stand up to the extent that a vat print will.

A difficulty too, which goes back to blue, refers to our old friend GCD which as you know is greened with hypochloride solutions. Let me point out that if you are handling or dyeing yarns to be used for towels, for example, which are woven with a blue stripe, frequently with the name of the hotel on them, if you incorporate that type of blue on a white towel, it is going to be green when it comes out of the laundry because that kind of towel had to be washed with the white work. It is true that the laundryowner can bring that back with a little hydro but nevertheless it causes some dissatisfaction.

Another difficulty which I think you folks will have to cooperate in, as well as we, (and we have been trying to do it) is the education of the consumer to the fact that American dyers are not inferior to German dyers, or that American dyestuffs are not inferior to German dyestuffs. We hear it everywhere. The housewife has been told it so often, probably by retailers, that she believes it. You all know the truth of the matter and yet many a housewife believes that. There are some rather interesting figures I have to show the fallacy of that. For example I saw some figures in a Government report just recently issued which prove that the housewife's assertions are not correct.

In 1914, for example, there was a little less than 2,000,000 pounds of vat dyes other than indigo used. In 1922 the figures published by the Government show about 2,815,000 pounds, and in 1929, a period when the housewife said the American dyer didn't know his business, there were about 10,800,000 pounds of so-called vat dyestuffs used other than indigo.

Those figures do not bear out the housewife's assertions.

In closing, I simply want to say this: that I believe one of the problems of your industry is that you know how your materials are going to be handled after they leave your hands and get into the hands of the consumer. The more you know about the way in which that fabric is going to be handled, the better it is going to be for the type of merchandise that you are producing.

Please remember that fabrics have the same properties in a laundry or in a dry cleaning plant as they have in any mill or finishing plant in the country. The properties are exactly the same and I do believe there is every reason under the sun why mill men should work in closer harmony with both the dry cleaning group and the laundry group in learning how their materials will be handled after they leave their plant. (Applause).

Chairman Gaede: Thank you, Mr. Johnson.

Mr. Johnson has brought out a lot of points which perhaps weren't clear in the minds of some of us. Are there any questions anyone would like to ask of Mr. Johnson?

Mr. Thompson: Mr. Johnson, has there been an increase in complaints in the last six or twelve months, in the number of color complaints?

Mr. Johnson: I would say frequently this is true of

colors, and I think the figures I read will bear this out: laundries are having less trouble today with colors than ever before. I don't mean to say that the millennium is at hand. We are always going to have price merchandise and that price merchandise is always going to give trouble, but I do believe that our industry is having less trouble today in colors than ever before. I believe there are more fast dyed colors and fast printed colors coming to our plants than has ever been the case.

Mr. Freedman: Mr. Johnson, how about bathmats and chenille rugs? Have you had any difficulty with those and how are they laundered?

Mr. Johnson: You mean with regard to colored bathmats coming into use?

Mr. Freedman: Yes.

Mr. Johnson: That has been somewhat of a problem. They are not handled with the whites. They have to be handled in an entirely different classification; depending upon their color they would probably be handled at a temperature of 100 degrees with soap and alkali without bleach. That is the average way in which they would be handled. If they are handled with whites the colored areas strip. If they are handled at too low temperatures they are not washed clean. But normally they would be handled at temperatures of between 100 and 110.

Mr. Freedman: How about boys' wash suits?

Mr. Johnson: They would receive, unless they were covered with grease, a washing formula very similar to the fast color formula I mentioned a moment ago. The highest temperature probably would be around 140 degrees with soap and alkali, again without bleach.

Mr. Freedman: Have you had any difficulty with beach pyjamas which have come into such vogue this past year?

Mr. Johnson: Aside from shrinkage we haven't had so much trouble. They are such beautiful shades. That is an illustration of a classification which I mentioned a moment ago as being divided into light pink and light blue or dark color classification. In other words that material is handled according to color. The highest temperature in that work would be 100 degrees normally.

Mr. Freedman: Has there been noted any greater degree of deterioration in beach pyjamas than is found in other white goods?

Mr. Johnson: We personally have had no complaints along that line.

Dr. Jos. F. X. Harold: I should like to ask a question that might guide the analyst in making trials as to resistance to laundry, first, what has been Mr. Johnson's experience as to the maximum detergent formula for soap; and then, how many trials—would it be twelve or more—would represent the average laundry rundown?

Mr. Johnson: If I understand your question correctly, you are wondering at the concentration of soap that would likely be encountered.

Dr. Harold: No, the concentration of soap that would represent the maximum detergent power of soap, which I have variously heard to be one-tenth to one-quarter of a per cent. I would like that question settled.

Mr. Johnson: I think the former figure is more nearly correct. There is no reason why a laundry couldn't use a quarter of a per cent, if it could, but it can't because of the construction of the washers. In other words, if we get much more than a tenth of a per cent of soap we immediately have suds all over the washroom floor, so we are absolutely limited in our soap concentrations to a concentration of about a tenth of a per cent. The alkali concentration will vary entirely with the alkali used. In the case of meta-silycate, trisodium phosphate or carbonate, it normally is used in a mixture of two to three parts by weight of neutral soap to one of alkali. When we are using the modified sodas or the sesquicarbonates, the proportion normally is one to one. On the other hand, where plants are using caustic soda in liquid form, the dilution may be as low as one part of 76 per cent caustic to eight pounds of soap, that is, in that proportion.

The second part of your question I don't quite remember.

Dr. Harold: Is it a common practice to repeat a number of washings and regard that as representative of laundry practice? I think I have heard it frequently said that 12 is about the number that represents laundry rundown. I wondered if that was adequate. Is it too harsh or is it not severe enough?

Mr. Johnson: We generally in our testing work, which we have done for mills in the last two years, have suggested a minimum of 20 washings. The reason we have done that is that if a garment is worn during one week it is a safe assumption that it will be laundered during the next, so that twenty washings actually are the equivalent of at least 40 weeks of service and in most cases are the equivalent of at least a year's service. So that we would normally figure 20 washings.

Mr. Thompson: What is being done in the industry in connection with blankets, wool blankets particularly?

Mr. Johnson: In the laundry industry?

Mr. Thompson: Yes.

Mr. Johnson: I am very glad you brought that up.

As I said very briefly in the course of my talk, the laundry industry has clearly come to the realization that blankets and woolens have to be handled separately. In the old days, so-called, blankets were normally handled in what were termed "pony washers," small wash wheels operating at low rates of speed, the idea being that with the fewer revolutions per minute the pounding action would be decreased. However, that sort of washing does not produce the results that are obtained with blanket equipment especially designed. So that you will find on the market today a wye pocket type of washer operating at a very low rate of speed and including finishing equipment containing stretchers. In other words, the blankets are

stretched after washing to as near the length required as possible.

There are also on the market washers built somewhat on the mill or dolly principle. I refer to the squeeze roll type of washer which has been on the market for some few years.

There is a third type of wash wheel on the market with only a limited use, largely in the Philadelphia district.

The point is that special wool washing equipment has been developed and I think the wool blanket manufacturers are recognizing that fact.

Mr. Thompson: Are the laundryowners encouraging the householder to wash her blanket?

Mr. Johnson: We are telling her that for best results she should send it to us because we know we can do a better job. (Laughter).

It is a hard job and that is why we believe we can do a better job than she can hope to do, because we have the equipment and she hasn't. As a matter of fact if you should ask the Wool Blanket Manufacturers Association they would bear out my remarks.

Mr. Thompson: Then, again, not many laundries are equipped to handle that type of work.

Mr. Johnson: Most of the laundries are getting there. In other words, wool blankets are not the problem they were years ago. If a plant isn't equipped for it, it can get into trouble, but the properly equipped plant can do a splendid job.

It might interest you to know the way the Wool Blanket Manufacturers have worked with us along those lines.

A year ago a committee consisting of their president and secretary, Mr. Northrup, came to our headquarters at Joliet and we permitted them to prepare a paper for our monthly publication and when their washing directions were analyzed it was found there wasn't a single thing they had advocated which we hadn't advocated to our own members for many years. In other words, they merely endorsed the washing methods we were distributing to our own members.

Mr. Freedman: Is the laundry washing rugs to any extent?

Mr. Johnson: That is a question that can better be answered by Mr. Stutz than by myself. Most of them are handled by special rug cleaning plants, I think. Isn't that so, Mr. Stutz?

Mr. Stutz: I think that is right.

Mr. Henry F. Herrmann: I would like to ask Mr. Johnson whether the laundry industry as a whole is pretty well organized under your control and supervision or whether there are still many laundries in smaller localities which are doing work more or less according to their own ideas?

Mr. Johnson: You mean whether or not we have contact with the entire industry?

Mr. Herrmann: And control.

Are the methods you have described generally applied throughout the country or are they ideal conditions?

Mr. Johnson: Here is about the way that works out:

We have in our association about 2300 members, all over the United States and Canada. That represents, on a safe estimate, 70 per cent of the volume of the country. There are still probably 4000 or 4500 plants, small plants, that are not in our Association. But they are covered, if not by us, through the allied trades, who are in pretty close agreement with our own findings. So if we don't reach them directly we reach them indirectly through the allied groups.

Mr. Herrmann: The reason that came to my mind was because of a rather surprising incident.

A manufacturer—I would rather not say where he is—making a high grade washcloth dyed solid, except for a little white edging, with vat colors, thought as an experiment he would send some of these to the local laundry, represented as one of the larger laundries of his community. At the same time he took some home. Those that were taken home were washed by his wife in a regular electric washing machine, by methods that the housewife had learned to be safe for cleaning articles of that description, at the same time protecting the colors. The washcloths came through three washings and after they were all finished I had a chance to see them, and compared with the new ones there was no change whatsoever in color. The other set that went to the local power laundry came back after one washing with a loss of about 80 per cent of color. There was no bleeding into the white. It was just more or less of an 80 per cent stripping of the shade.

A little laboratory work revealed that in order to duplicate that one would have to take a minimum of 5 per cent of soda ash with a considerable amount of chlorine and boil it for one hour. (Laughter).

Mr. Johnson: I am very glad you brought up that point, for this reason: Let me assure you again—

Mr. Herrmann: I would be just as glad to know the answer as you.

Mr. Johnson: In other words, here is the situation, getting back to that point: as I said a moment ago your suds concentration cannot possibly, under operating conditions, exceed a tenth of a per cent. It isn't physically possible unless you want to have soap all over your washroom. Your alkali concentration is always controlled by its being half of the soap concentration. In other words, it gets back to the point I made a moment ago about the effect of friction.

In the case you called attention to, either by design or mistake, that piece had been handled with the white washing formula. That I think is the answer to that. I don't believe colored goods normally would show that difference. It hasn't been borne out. That is an exceptional

case. I should like to know the whole history on it before commenting on it.

Mr. Herrmann: Some of the stuff is boiled pretty hot.

Mr. Johnson: No. The only place a laundry would normally boil would be in the handling of greasy stuff. Normally the highest temperature you have in the suds, speaking of white goods, would be in the neighborhood of 160 to 165 degrees. The first bath, what we call the breakdown, reaches a temperature not exceeding 100 degrees. About 40 per cent of that water is drained off. When you add hot water, your next bath does not normally reach over 130 or 135 degrees temperature. The temperature of your third suds would be in the neighborhood of 145. In other words, it is a gradual stepping up.

That I think got special treatment somewhere.

Mr. Butler: Getting back to the subject of blankets, I noticed an "ad" in the Monday afternoon papers of B. Altman & Co. They were advertising blankets, I think the North Star Blanket, and they were offering to have them laundered free within one year after purchase. I am not sure whether the name of the laundry was given in the paper, but they furnished a coupon with each blanket, they said, and I understand it is the White Mountain Laundry. I am not positive about that.

Mr. Johnson: There is a tendency at the present time for considerable cooperation locally between laundries and retailers. There have been a number of very interesting examples of that. For instance, your perhaps noticed some of the sheeting "ads" in this vicinity.

I recall a very good example in the sale of wash dresses in a very large store in Cincinnati, where the store and laundry jointly advertised a certain type of wash frock, I believe retailing at a dollar. There were 32 of those frocks, picked out at random, and laundered a given number of times—I forget the number now. And as I say the two of them came out with this joint "ad," and it is just as true as gospel: "This is what happens to good merchandise bought at a good retailer and sent to a good laundry."

There, gentlemen, is your answer.

Chairman Gaede: I am sorry that time doesn't permit us to continue this discussion. If there are any further questions perhaps they can be brought out later.

It certainly has been very interesting to hear about the problems of the laundryowners. We are now to hear the other side, and that is the dyers and dry cleaners' problems. I should like to introduce at this time Mr. Paul C. Trimble, Managing Director of the National Association Institute of Dyers and Cleaners, who will talk about their problems.

Mr. Trimble! (Applause).

Mr. Paul C. Trimble: Mr. Chairman and Gentlemen: Your program as it came to me said, "George H. Johnson, Director, Department of Research, Laundryowners National Association of the United States and Canada, will deliver a paper on the Laundryowners' Problems in Relation to the Dyer and Finisher."

I took courage from that and prepared a paper of my own, so that these two associations might continue the practice that has been well-established over a period of years of working in harmony with each other. But it looks to me like there is some slight evidence of a split or a schism here because he delivered an address and after I get you thoroughly put to sleep with this paper that I have here in my hand he and I will get together and settle this matter once and for all. (Laughter).

Before launching into it though I want to take up this subject of blankets, while it is hot. I want to invite you to send your blankets to the dry cleaner's establishment. (Laughter). I might mention one particular dry cleaning establishment which has been quite successful along that line. The address is 7901 Georgia Avenue, Silver Springs, Maryland. (Laughter).

Seriously, there is this point to be made: I think it is almost impossible to properly process a white or cream colored wool blanket without using water on it. Bleaching goes with water, as you know, and not with a dry absorbent. But within the last year we have worked out a method of dry cleaning wool blankets that come in colors, plaids, shades of different sorts—and the percentage of colors made of those colors seems to be growing—through the medium of what we call a strong soap solution, but it is a different kind of strong soap solution than they used on the washrags, which gives you an absolutely clean garment, and avoids all that possibility of felting that Mr. Johnson referred to when he talked about handling woolen goods in the laundry.

Furthermore, after that process, it is standard practice in a good dry cleaning plant—and there are just about as many good dry cleaning plants as there are good laundries or perhaps from the standpoint of the consumer you would care to put the corollary the opposite way (laughter) to dry blankets under steam pressures that are held down with check valves and that are controlled in such a manner on the frames that you cannot get anything but light, fluffy, downy covering for your bed from that method.

Again let me emphasize especially your dark colored blankets. We invite you to send them to the dry cleaning plants. (Laughter).

Now on the serious (if any) side of dry cleaning and its relation to the textile field.

Mr. Trimble presented his prepared paper. (Applause).

(Mr. Trimble's paper will appear in the next issue of the AMERICAN DYESTUFF REPORTER.)

Proceedings of the American Association of Textile Chemists and Colorists

Rayon Identification

(Tentative Report of Rayon Sub-Committee)

Members of Rayon Sub-Committee

Appel, Wm. D., Textile Div. Bur. of Standards.
Beauregard, Roy J., Aberfoyle Mfg. Co.
Church, Chas. H., Rumford, R. I.
Corkum, Harold D., Amoskeag Mfg. Co.
Dengler, Carol E., United Piece Dye Works.
Green, Henry, Tubize Chatillon Corp.
Hathorne, B. L., (*Chairman*) Tubize Chatillon Corp.
Harold, Jos. F. X., Textile Consultant, Chemists' Club, N.Y.C.
Johnson, A. K., Tubize Chatillon Corp.
Lotte, Edw. F. L., National Silk Dyeing Co.
McGibbon, James J. American Glanzstoff Corp.
Olney, Prof. L. A., Lowell Textile Institute.
Ordway, Chas. B., Alabama State College.
Powers, D. H., United States Finishing Co.
Quig, J. B., DuPont Rayon Corp.
Scott, Walter M., Textile Consultant, Boston, Mass.
Chandler, C. S. DuPont Rayon Corp.

RAPID METHOD

THE following systematic scheme, when carried out in the given sequence, serves for the rapid identification of rayons. This method can be depended upon by an experienced analyst, particularly when used in conjunction with *filament count* and *microscopical characteristics*. For the inexperienced man we recommend the detailed method of Rayon Analysis, and a comparison of the unknown rayon with standard samples of known make. The standards should be as inclusive of the rayon field as possible and should be kept up to date.

Test 1—Identification of Animal Fibers

Millon's Test.

Animal fibers—real silk, wool and hair—are quickly and positively identified by means of Millon's Reagent. (See Identification of Rayon—Detailed Method.)

Test 1A—Identification of Animal Fibers, Cellulose Fibers and Cellulose Acetate

Flame Test.

Twist five or six strands of the unknown sample into a long, compact mass. Push the end of sample gently toward a match flame. (Do not allow sample to actually touch the flame.)

Animal fibers tend to fuse and burn slowly when brought near to a flame. If the flame of the burning fibers is extinguished, the odor of the white fumes which subsequently arise from the smoldering end will have a "burned hair" odor. The burned ends of the fibers will have a dark, hard, brittle knob of material. Heavily mineral-weighted silks will leave a distinct ash which more or less retains the shape of the original material.

Vegetable fibers and most rayons do not fuse in the burning. They burn rapidly, and the fumes coming off after the extinguishing of the flame smell like burning cotton. *Acetate rayons, in burning, smell like cotton and melt like animal fibers.* The fused knob remaining after the flame is extinguished is hard but not brittle. If heated to a sufficient degree (in an evaporating dish or other suitable container) acetate fibers will melt without burning.

The burning test, while helpful, is not as instructive as the Millon's Reagent Test, inasmuch as it does not show the relative quantities and locations of the animal and vegetable fibers in mixed yarns or fabrics.

Test 2—Identification of Cellulose Acetate Rayon

Solvent Test.

Cellulose Acetate Rayon is soluble in acetone; also in boiling 40% Acetic Acid. (See Identification of Rayon—Detailed Method.)

Test 3—Identification of Nitrocellulose Process Rayon

Diphenylamine Test.

Nitrocellulose Rayon is turned blue by treatment with a solution consisting of 1% by weight of Diphenylamine dissolved in concentrated sulphuric, acetic acid mixture. (See Identification of Rayon—Detailed Method.)

Test 4—Identification of Viscose and Cuprammonium Rayons

Wright's Stain Test.

Wright's Stain Test solution colors air-dried cuprammonium rayon violet and air-dried Viscose Process Rayon blue. (See Identification of Rayon—Detailed Method.)

DETAILED METHOD

(*Tentative*)

Identification of Animal Fibers in Mixed Fabrics

Millon Test.

As small quantities of animal fibers present in un-

known samples may cause confusion in some of the following tests, an unknown sample should first be tested for the presence or absence of animal fibers. These are easily and quickly identified by means of the Millon Test, details of which follow:

Preparation of Millon Reagent.

Millon's Reagent is prepared by dissolving a given weight of metallic mercury in its own weight of pure concentrated nitric acid at room temperature in a non-corrodible container (porcelain, glass, agate, etc.). When completely dissolved, the solution is diluted and mixed with an equal volume of cold water. The solution should be clear.

If a yellow turbidity develops in the above noted solution, stir in a small quantity of nitric acid until the solution clears up.

Each new batch, or one which has stood open to the air for a long time, should be tested for proper activity by touching to the skin or by use of white animal fibers. When stored in air-tight glass stoppered bottles, the solution keeps for months.

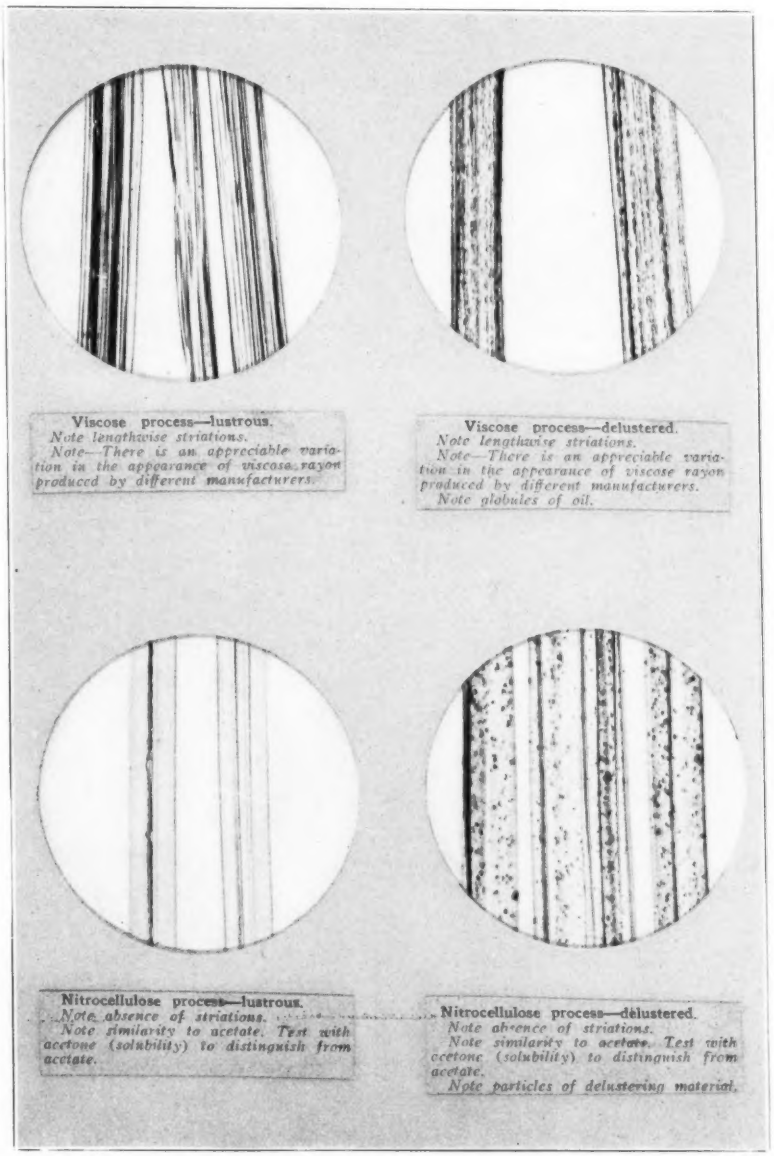
Use of Millon Reagent.

Moisten the unknown swatch with Millon's Reagent. Warm to blood heat (do not boil) for a few seconds, or allow to stand for a few minutes at room temperature.

Animal fibers turn red, thus showing both their presence and position or distribution throughout the pattern.

Nearly all dyed animal fibers show an observable change toward red in this test without previous stripping of dye.

Swatches wet with water or with alcohol appear to react normally if flooded with reagent (to dissolve first precipitate).



Viscose process—lustrous.
Note lengthwise striations.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.

Viscose process—delustered.
Note lengthwise striations.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.
Note globules of oil.

Nitrocellulose process—lustrous.
Note absence of striations.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.

Nitrocellulose process—delustered.
Note absence of striations.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.
Note particles of delustering material.

Figure 1

Caustic Test.

As minute quantities of cellulose and rayon fibers present in unknown samples largely composed of animal fibers may not be detected by the Millon Test, we recommend a subsequent caustic test for fabrics that appear by the Millon Test to be composed largely or entirely of animal fibers.

Although strength of solution, time and temperature may be varied over wide limits we recommend a ten per cent solution of caustic soda at 180° F. for ten minutes.

Animal fibers dissolve completely. Cellulose and rayon remain in fiber form. (Note—Cellulose Acetate is partially saponified; regenerative cellulose fibers soften and dissolve to a limited extent. Cellulose Acetate fibers may be removed previously to caustic boil by use of acetone.

Microscopic Identification of Rayon

As rayons are most easily, quickly and positively identified by means of a microscopic examination, we recommend that this method be used whenever possible.

A microscopic examination of rayon is very simple and can be successfully carried out by men previously unfamiliar with the use of the microscope after a few hours' practice.

For the benefit of those unfamiliar with the microscope and its use, we are pleased to describe the cheapest type of microscope that is, in our opinion, suitable for the microscopic examination of rayon. The analyst will need:

1. Microscope Stand and Lenses.

The instrument should be capable of magnifying to 400 diameters.

Suitable apparatus can be obtained from:

Bausch & Lomb

Outfit No. FFS6

A similar type of apparatus can be obtained from:

Spencer Lens Co.

Outfit No. 44F

The cost of this apparatus is approximately $90.

The above combination includes achromatic objectives, 16 m.m. and 4 m.m., eye pieces 5x and 10x; and Abbe condenser N.A. 1.20.

2. Microscope Lamp.

Suitable apparatus can be obtained from:

Bausch & Lomb

Lamp—Catalogue No. 4597-C

Ground Glass—Catalogue No. 4579

Spencer Lens Co.

Lamp—Catalogue No. 370-B

The cost of this apparatus is approximately $24.00.

3. Microscope Slides and Cover Glasses.

4. Mounting Medium.

Methylene Iodide, or Monobromnaphthaline

5. A piece of thin glass rod.

6. A small scapple or sharp knife.

We wish to point out that while the simple basic microscope recommended here is sufficient to successfully analyze an unknown rayon specimen, the usual accessories such as a mechanical stage, measuring devices, and polarized light equipment may always be added when found necessary for work of a more comprehensive nature.

Naturally, it is advantageous to have a more elaborate type of instrument, such as is usually employed for research investigations, and when the means are available and the investigator sufficiently adept in the use of the microscope, we recommend that this type be obtained.

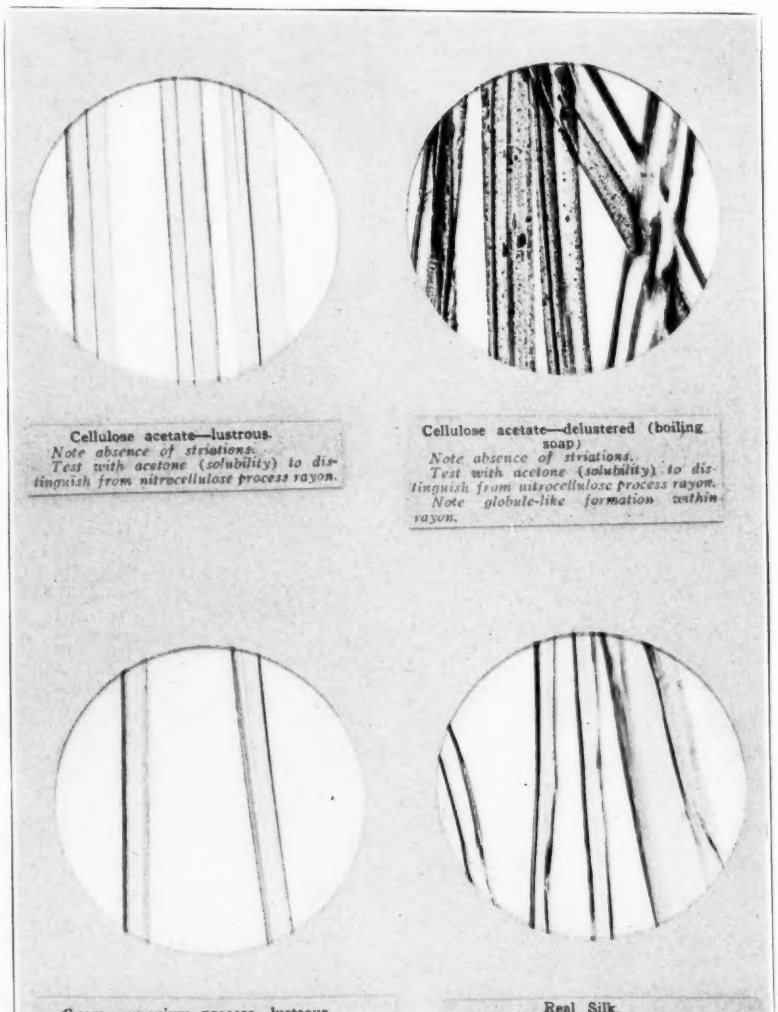

Cellulose acetate—lustrous.
Note absence of striations.
Test with acetone (solubility) to distinguish from nitrocellulose process rayon.
Cellulose acetate—delustered (boiling soap)
Note absence of striations.
Test with acetone (solubility) to distinguish from nitrocellulose process rayon.
Note globule-like formation within rayon.
Cupra-ammonium process—lustrous.
Note absence of striations.
Note size of filaments.
Apply Millon Test to distinguish from real silk.
Real Silk.
Note absence of striations.
Note size of filaments.
Note slight irregularities within individual filaments.
Apply Millon Test to distinguish from cupra-ammonium process rayon.

Figure 2

Lateral Method of Fiber Identification

The lateral method of fiber identification is preferred by the Rayon Sub-Committee because of its simplicity.

Procedure.

1. Separate individual filaments of the unknown sample.

2. Place yarn on microscope slide.

3. Apply a drop of the mounting medium to the yarn and slide.

4. Place cover glass over yarn and mounting medium

5. Press cover glass gently with a glass rod until mounting medium covers over the entire under side of the same.

6. Place slide on microscope stage.

7. Light microscope lamp and focus beam from same up through sample.

8. Focus microscope and observe sample.

9. Compare unknown sample with photomicrographs accompanying this report.

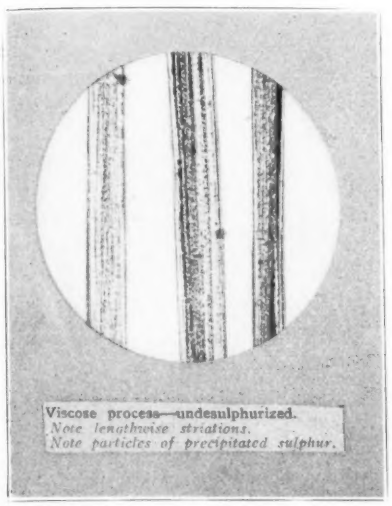


Figure 3

Cross-Sectional Method of Fiber Identification

Some analysts prefer the cross-sectional method of rayon identification. Others use it as a confirmatory check of the lateral method.

Of the many methods of preparing rayon cross-sectional mounts that are in general use today, we prefer the Schwarz sectioning plate (perforated slide) method. Other methods, for example the cork method, will give equally good results in the hands of skilled operators.

In addition to the apparatus required for making lateral examinations, the cross-section method of Rayon Identification requires the use of a Schwarz sectioning plate (obtainable from Spencer Lens Company or Bausch & Lomb) and a sharp blade; for example, a safety razor blade of the Gem type (guarded back).

Procedure.

1. Form a small skein or bundle of yarn (two to three inches long) from the unknown sample.

2. Insert one end of the small skein or bundle of yarn into an opening of the sectioning plate and pull through until the mass is held firmly.

3. Cut the entire mass as closely as possible to the plate. The cut should be made with a single stroke, sliding the blade rapidly and diagonally, in contact with the surface of the plate through the mass of fibers as pressure is applied. A *sharp* (safety) razor blade must always be used.

4. Place sectioning plate on microscope stage.

5. Examine with transmitted light (light thrown up through sample from mirror underneath the stage), using a 16 mm., 8 mm. or 4mm. objective and a 5 or 10x ocular according to the power of the light used and the magnification desired. Daylight can be advantageously used only with the lower magnifications.

6. Focus the microscope and compare with the photomicrographs accompanying this report.

Chemical Identification of Rayon

(1) Identification of Cellulose Acetate Rayon.

(a) *Acetone Test.*

Place yarn or fabric in U.S.P. acetone.
Cellulose Acetate is very readily dissolved.
So-called *"*iron-proofed"* Cellulose Acetate partially dissolves and leaves a leathery residue.
All other Rayons are unaffected by this treatment.

(b) *Acetic Acid Test.*

Place yarn or fabric in a boiling solution of 40% acetic acid (C.P. acid is not necessary).
Cellulose Acetate is very readily dissolved.
So-called *"iron-proofed" Cellulose Acetate partially dissolves and leaves a leathery residue.
All other rayons are unaffected by this treatment.

(*) *"Iron-Proofed" Cellulose Acetate.*

"Iron-proofed" Cellulose Acetate is Cellulose Acetate that has been treated with an Alkaline medium in such a way that the outside of each individual filament is partially saponified.

"Iron-proofed" Acetate yarn may be pressed or ironed at a higher temperature than untreated Acetate, because the layer of saponified or partially saponified acetate insulates the unaffected core of the yarn.

Treatments similar to iron-proofing, but more drastic, produce partially saponified yarn or fabric that can be dyed with direct cotton colors.

Partial saponification other than for iron-proofing is occasionally practiced. Such yarns produce a very considerable residue when treated by the acetone or acetic test for Cellulose Acetate.

(2) Identification of Nitro Cellulose Rayon.

Apply one drop of diphenylamine solution* to the dry unknown sample.

Nitrocellulose Rayon immediately turns a deep blue color after which it slowly dissolves to form a blue solution.

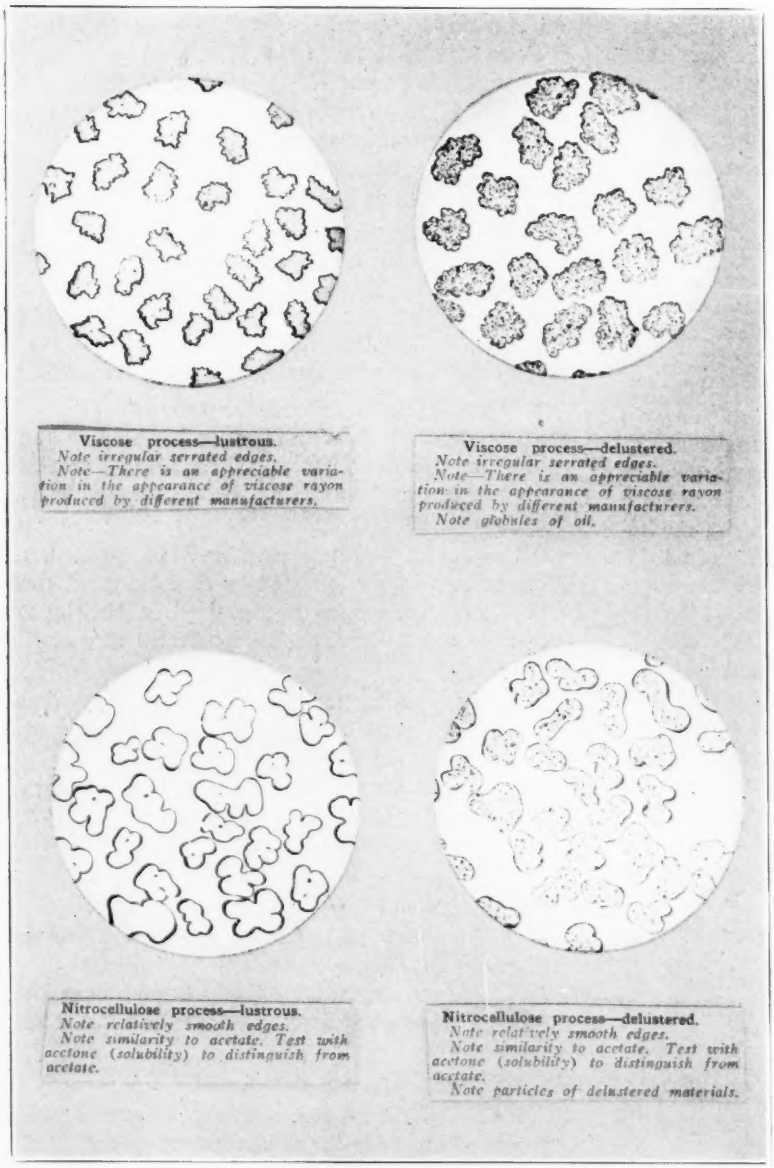
Other rayons are not colored blue.

All nitrated fibers—for example, Viscose Process Rayon nitrated for the production of special effects—show a blue reaction with diphenylamine solution. Many dyestuffs show a blue coloration when exposed to diphenylamine solution.

Nitrocellulose samples that have been stripped in a strong reducing bath will sometimes fail to give the blue coloration described above, however their cross-sections remain unaltered in shape.

The only positive test for Nitrocellulose Rayons is a microscopic examination.

(*) *Diphenylamine solution is prepared as follows*: Mix 66 grams concentrated sulphuric acid with 33 grams of glacial acetic acid, then add 1 gram Diphenylamine.



Viscose process—lustrous.
Note irregular serrated edges.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.

Viscose process—delustered.
Note irregular serrated edges.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.
Note globules of oil.

Nitrocellulose process—lustrous.
Note relatively smooth edges.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.

Nitrocellulose process—delustered.
Note relatively smooth edges.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.
Note particles of delustered materials.

Figure 4

(3) Identification of Viscose and Cuprammonium Rayon.

(a) *Wright Stain Test.*

Prepare a saturated solution of Wright Stain (dry powder) in denatured alcohol (95%). Immerse *air-dried* unknown sample into boiling Wright Stain solution and boil for a few seconds. Rinse the sample thoroughly in cold water.

Viscose Process rayon is stained blue by this treatment.

Cuprammonium Rayon is stained violet.

(b) *Schreiber-Hamm (Sulphide) Test.*

A five-gram sample of the unknown Rayon (Viscose or Cuprammonium) is placed in a flask together with 100 cc. of water and 3 cc. concentrated sulphuric acid. The mouth of the flask is covered with a piece of lead acetate paper and allowed to stand on a moderately boiling steam bath for four hours.

If the sample is Viscose Process Rayon, the lead acetate paper will be stained brown or black.

If the sample is Cuprammonium Rayon, no discoloration should be observed.

(4) Identification of Undesulphurized Viscose Process Rayon.

The difficulty of visually distinguishing between some delustered rayons and undesulphurized Viscose Process Rayon has sometimes led to confusion and improper Rayon Identification.

Undesulphurized Viscose Process Rayon can be readily identified by means of sodium plumbite solution.

Preparation of Sodium Plumbite Test Solution.

(1) Dissolve forty grams lead nitrate in 200 cc. of warm water.
(2) Dissolve seventy grams of caustic soda in 300 cc. of water.
(3) Add the caustic soda *solution to* the lead nitrate solution.
(4) Filter.
(5) Dilute to two liters.

Method of Testing.

A small quantity of the solution prepared as above is brought to the boil. The unknown Rayon sample is inserted into the boiling test solution for a period of one-half minute.

Undesulphurized Viscose Process Yarn turns black. Incompletely Desulphurized Viscose Process Yarns

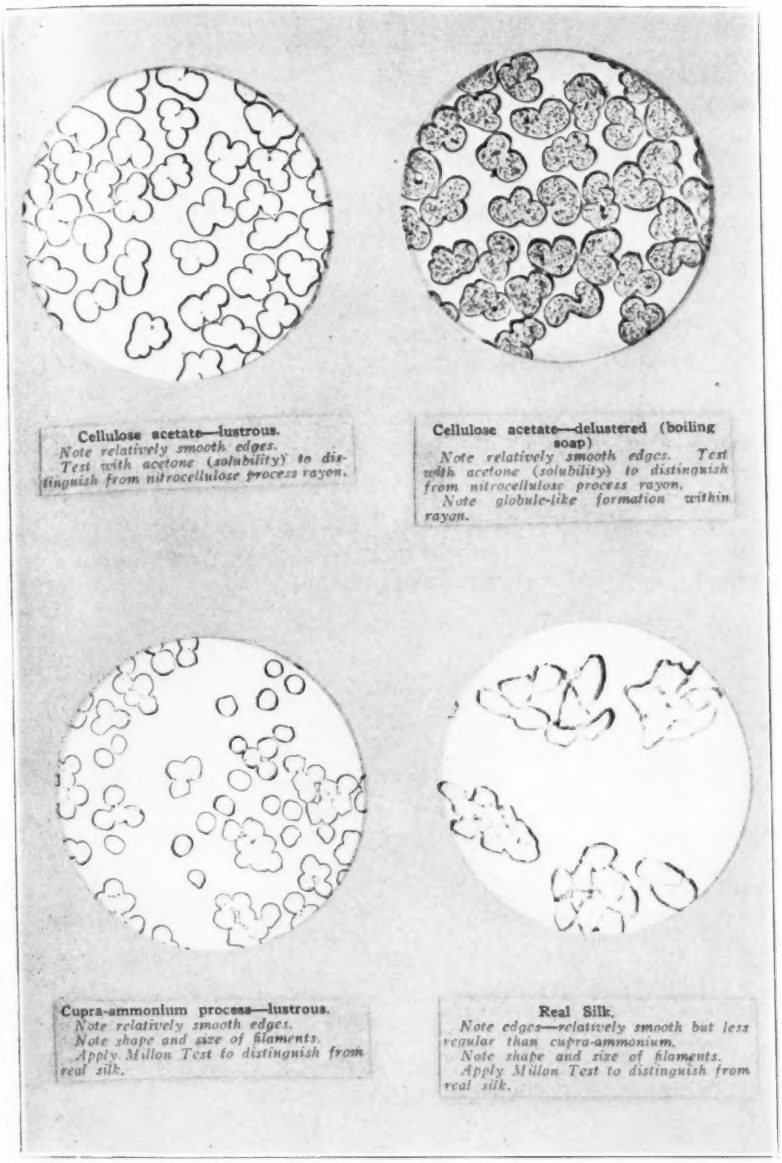

Cellulose acetate—lustrous.
Note relatively smooth edges.
Test with acetone (solubility) to distinguish from nitrocellulose process rayon.
Cellulose acetate—delustered (boiling soap)
Note relatively smooth edges. Test with acetone (solubility) to distinguish from nitrocellulose process rayon.
Note globule-like formation within rayon.
Cupra-ammonium process—lustrous.
Note relatively smooth edges.
Note shape and size of filaments.
Apply Millon Test to distinguish from real silk.
Real Silk.
Note edges—relatively smooth but less regular than cupra-ammonium.
Note shape and size of filaments.
Apply Millon Test to distinguish from real silk.

Figure 5

are turned black, dark brown, or medium brown, depending on the degree of desulphurization.

Desulphurized Viscose Process Yarn is stained a brownish yellow color.

When possible, check tests on known samples should be run simultaneously with the test.

Electroscope

The Rayon Committee wishes to state that, in its opinion, the electroscope (an instrument that is reputed to identify Rayon yarns by measuring the difference in static capacity) is unreliable as a means of identifying rayon.

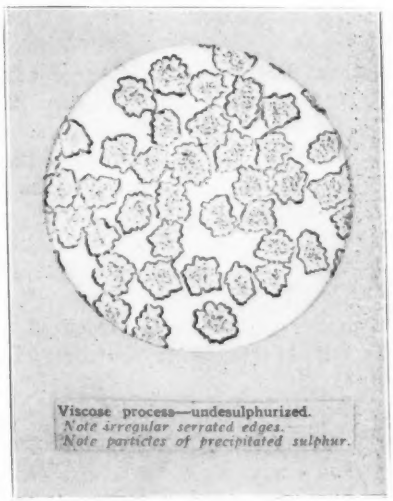


Figure 6

Remarks

The above described methods of analysis will differentiate between the four chemical types of rayon as offered to the trade during 1931. The Rayon Committee calls careful attention to the fact that all rayon companies are today producing small lots of various experimental yarns that are distributed to fabric manufacturing mills for practical tests. Samples of these experimental yarns are sometimes sent to plant chemists for identification. Obviously, the above described tests may not successfully identify all special experimental yarns.

We also wish to state that, with certain exceptions, it is, in our opinion, impossible to positively identify trade brands of rayon produced under any particular process.

Chemical identification of an unknown sample is at the present time of much less importance than is the determination of its physical characteristics (appearance, tensile strength, elongation, filament count, cross section, etc.).

CALENDAR OF COMING EVENTS

Council Meeting—Oct. 16, 1931, Boston, Mass.

Meeting of Research Committee—Oct. 16, 1931 Boston, Mass.

APPLICANTS FOR MEMBERSHIP

Junior

Norman S. Goodyear, Director of Dye Manufacture, Dip-it, Inc., Stamford, Conn. Sponsors: Henry F. Herrmann and Dr. H. Myers.

M. C. Bridges, Ass't Colorist, Piedmont Print Works, Taylor, S. C. Sponsors: John C. Cosly and Geo. P. Feindel.

Robert L. Horney, Laboratory Manager, Ciba Co., Inc., Greenville, S. C. Sponsors: John C. Cosly and Geo. P. Feindel.

Raymond L. Matthews, Student, Lowell Textile Institute, Lowell, Mass. Sponsors: L. A. Olney and H. C. Chapin.

Active

Clifford W. Sampson, Service Chemist, Tubize Chatillon Corp., New York, N. Y. Sponsors: B. L. Hathorne and L. A. Olney.

A. M. Boyd, Dyer, Victor Monaghan Co., Greenville, S. C. Sponsors: Hugh Puckett and W. R. Ivey.

Elmer E. Fickett, Ass't Prof., Dept. of Chemistry and Dyeing, Lowell Textile Institute, Lowell, Mass. Sponsors: L. A. Olney and Harold C. Chapin.

Alfred C. Goodings, Director, Textile Dept., Ontario Research Foundation, 47 Queens Park, Toronto 5, Ont., Canada. Sponsors: Alex. Morrison and Walter M. Sullivan.

Ernest H. Metzner, Supt. Dyeing, Forstmann and Hoffmann Co., Passaic, N. J. Sponsors: Robert H. Gaede and D. P. Knowland.

Frank Sokasits, Dyer, Forstmann and Hoffmann Co., Passaic, N. J. Sponsors: Robert H. Gaede and D. P. Knowland.

Emil O. Maeckel, Supt. of Dyeing, Forstmann and Hoffmann Co., Passaic, N. J. Sponsors: Robert H. Gaede and D. P. Knowland.

Robert E. Devine, Chemist, Associated Dyeing and Printing Co., Inc., Paterson, N. J. Sponsors: S. F. Carter and P. J. Wood.

Francis J. Wilcox, Overseer of Dyeing, Greenwich Bleachery, E. Greenwich, R. I. Sponsors: Arnold G. Tein and R. F. Culver.

NOTICE

to

MEMBERS

of

THE AMERICAN ASSOCIATION

of

Textile Chemists and Colorists

The Annual Meeting

will take place in

Boston, Mass.

on

December 4th and 5th

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN ALBIN JOHNSON
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
440 Fourth Avenue, New York City

A. P. HOWES, President — M. D. REESER, Secretary — H. F. CRAWFORD, Treasurer

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00

Vol. XX October 12, 1931 No. 20

WAGE CUTTING

THE problem of wage cutting has been brought to the fore rather strongly in the last several weeks by the action of several large corporations who have seen fit to bring about reductions in their particular industry. They have been followed closely by many other smaller concerns. Opinion is divided as to the effect such a wage reduction will have on industry and economic conditions as a whole. Some claim that it will only prolong the period of depression, some that it was to be expected as a step in the direction of further equalization of economic conditions, and others that it will hasten the return to prosperity. The first and last, which may be regarded in the light of predictions, are in direct contradiction to each other. The second is really what has taken place and what was to be expected. The two predictions mentioned, however, must also be considered.

This brings up the question of whether these reductions were justifiable. In view of the decreased earnings of the companies involved they probably are. With the lower prices that are now in effect, production costs must be cut down. This is most easily, although probably not in all cases most willingly, done by reducing labor costs. If the higher wages continue it means a decreased dividend for the stockholders or in many cases the dividends will be passed or a loss sustained. With reduced wages there is a greater probability of meeting the dividends. In one case the wage earner is benefitted and in the other it is the capitalist who is favored. The question resolves itself into one in which it must be decided who is to "suffer"—labor or capital. Should one be favored more than the other? Both are necessary. Capital supplies the wherewithal to establish and conduct industries, but without labor there is no production. On the other hand, labor, without the necessary materials and equipment with which to work, is insufficient. One is indispensable to the other.

Perhaps capital has already sustained its share of the loss. It bore the brunt of it when the depression started and, for the most part, has carried it ever since. This means money loss and not loss of employment which has affected the laboring class to such a large extent.

Naturally, labor is not willing to grant any more concessions than are absolutely necessary. They do, in most cases, have to take what is forced on them. Rather than not work at all they would work for reduced compensation. Anyone will object to a decrease in income whether one represents the laborers or the capitalists. With little return from investments, capital is discouraged and such a condition will not hasten the return to prosperity. Low wages bring about discontent among the labor groups and lead to trouble and violence.

The question of which faction should be favored is probably best answered by the question—"Who will lead us out of the depression—capital or labor?" Some say that it is capital which can do the most in this direction. In that case they should be the favored ones, thereby encouraging further investments. But then, on the other hand, the large majority of ultimate consumers are people who belong to the laboring classes. Volume sales originate within this class. If their buying power is cut down to a minimum, prosperity's return is delayed.

It is obvious then, that both capital and labor will have to take their losses. Lower living costs call for lower wages but not so low that the standard of living will be brought down. And so then until a business revival sets in, we will have to content ourselves with lower wages and low returns on capital invested.

EDWARD F. L. LOTTE

Edward F. L. Lotte, who died recently, was vice-president of the National Silk Dyeing Co. He was born in Philadelphia, September 18, 1868, the son of Edward A. and Pauline E. Lotte. He started to work in his father's skein dyeing shop at the age of 11, working during the day and attending school in the evening. He took courses at Temple University, and then enrolled in the Pennsylvania Museum and School of Industrial Arts (now Philadelphia Textile School), graduating in 1892.

With his two brothers, Charles E. and Walter C. Lotte, and Mr. Mazeres, he organized the firm of Lotte & Mazeres Company on August 1st, 1895, and was president of that company from 1895 to 1903. The rapid development of the silk manufacturing industry in the Lehigh Valley and the need for more room and equipment to handle the increasing business finally caused the company to transfer its entire operations to Allentown, Pa., in 1899. This plant later became the Allentown Works of the National Silk Dyeing Company.

On January 1st, 1905, Mr. Mazeres retired, and the

corporate name was changed to Lotte Brothers Company, Edward F. L. Lotte was president of the new company, Walter C. Lotte vice-president, and Charles E. Lotte secretary and treasurer.

In 1909 Lotte Brothers Company merged their interest with those of several other silk dyeing concerns into the National Silk Dyeing Company. Upon the organization of the new concern, Edward F. L. Lotte became general manager and chairman of the executive committee. In addition to his other duties, he assumed the active supervision of the Dundee Lake Works, and lived to see that plant become one of the largest and most successful piece silk dyeing and printing plants in the world. He served the National Silk Dyeing Company from its inception until his death. He was vice-president of the company at the time of his death.

In 1920 he was appointed by the Secretary of State of the United States to represent the silk industry as a member of the Dyes and Chemicals Committee of the Textile Alliance.

He was an official arbitrator for the Silk Association of America, and served in that capacity a great many times. He was formerly chairman of the New York Section of the American Association of Textile Colorists and Chemists, and served for several years on the Research Committee of that organization.

During the 10 years prior to his death he was a member of the Board of Trustees of Bucknell University and was formerly a member of the Board of Corporators of the Peddie Institute.

He was a member of the Board of Directors of the National Silk Dyeing Company, the United States Trust Company of Paterson, and the United States Testing Company. He belonged to the Hamilton Club and the Elmwood Country Club, both of Paterson.

He is survived by his widow, Mary Viola; a daughter, Mrs. Paul L. Miller; a son, C. Walter; two brothers, Charles E. of Paterson and Walter C. of Allentown, Pa.; two sisters, Mrs. Edward A. Bosshardt and Mrs. Joseph Peters, both of Allentown; and two grandchildren, Mary Helen and Edward Albert Miller, of Paterson.

EDITORIAL NOTE

The article in the August 31st issue of the Dyestuff Reporter entitled "Seller Go Easy—Buyer Beware," has created considerable interest which has been fairly evenly divided between criticism and commendation.

It is not the intention of the Dyestuff Reporter to publish any article that will be displeasing to anyone. Yet we find oftentimes that an article which brings criticism from some is highly commended by others and vice versa.

We shall be pleased to publish any comments, reply, or return article that may be presented in connection with the article in question, and in this way, it is hoped that if it will be of any interest to our readers a complete discussion of this whole subject may be brought forth.—L. A. O.

T. R. I. Activities

The United States Institute for Textile Research has provided the textile industry, for the first time, with a complete plan for research on the cooperative basis, and with an organization capable of operating that plan when and if adequate moral and financial support is made available. It has at present 98 annual, 36 contributing, and 2 life members. The following six institutions have qualified as participating laboratories: Massachusetts Institute of Technology, Bureau of Standards, Lowell Textile Institute, U. S. Testing Co., Textile Department, Clemson College, and the Textile School, North Carolina State College.

At the first three participating laboratories mentioned, work has been started on the following problems:

Scientific study of the wear of fabrics and the development of methods for measuring the resistance to wear.

Investigation of the relative suitabilities of the present methods for testing yarns.

Study of the causes of shrinkage of cotton and wool.

Development of testing methods for the fastness of dyes.

In addition research has also been started on 70 other problems.

Meeting Held

The first fall general meeting of the Synthetic Organic Chemical Manufacturers Association was held at the Princeton Club of New York on Thursday, September 17th. President August Merz presided.

Following the luncheon an address was delivered by Trade Commissioner W. T. Daugherty, of Berlin, Germany, concerning general conditions in Germany.

Exports of American Coal-Tar Dyes

According to a Department of Commerce bulletin, American exports of coal-tar colors, dyes, stains and color lakes during the first six months of 1931 went to 63 world markets. The ten leading countries of destination are shown in the following table:

	Jan.-June, inclusive, 1931	
	Pounds	Value
China	8,058,621	$1,127,407
Japan	710,773	426,764
Canada	845,940	372,061
British India	699,157	303,838
Germany	387,204	76,579
Belgium	210,809	52,640
Mexico	89,067	49,850
Netherlands	221,268	37,040
Hong Kong	123,142	32,011
Argentina	59,295	21,492
Other countries	412,268	177,281
Total six months, 1931	11,817,544	$2,676,963
Six months, 1930	16,392,425	3,602,396

Metallic Salts of the Free Acid of Orange II*

By NEIL E. GORDON, GEORGE SEIDEL, B. W. ALLAN, and C. M. LOANE
Johns Hopkins University

Some years ago, in the course of a study of the effect of hydrogenion concentration on the so-called adsorption of dyes by hydrous oxide gels, one of the present writers and Marker[1] remarked certain phenomena which were interpreted at that time as indicative of compound formation. Some time later Weiser and Porter[2] questioned these conclusions upon the basis of the improbability of forming an appreciably soluble salt from the much less soluble gel (hydrous alumina) and "a weak, slightly soluble acid" (free acid of Orange II) and described the product analyzed by one of us and Marker as a mixture of alumina gel and the "insoluble acid" in equivalent ratio. Although the remarks of Weiser and Porter involved certain obviously erroneous assumptions they appeared to cast doubt upon the validity of the conclusions presented in the original publication, if not upon the good faith of the original investigators. Accordingly, it seemed desirable to re-examine the whole matter carefully and by means of a procedure so detailed as to leave no room for ambiguity in the results obtained.

IT IS well known to organic chemists that the aromatic sulfonic acids (of which the free acid of Orange II is an example) are, as a group, both strong and soluble acids. Furthermore, Sisley[3] had reported quantitative figures indicating the high solubility of this acid both in water and in HCl solutions up to 0.25N in concentration, and had concluded from the large excess of mineral acid necessary to displace it from its sodium salt (Orange II) that it was a strong acid —facts apparently overlooked by Weiser and Porter. Sisley's observations as to solubility were confirmed qualitatively by one of the present writers and Reinmuth[4, 5] and potentiometric measurements fully bore out his conclusions as to the strength of the acid.

Aluminum

The aluminum salt of the dye acid was prepared by one of our number and Reinmuth[4, 5], under various conditions. A summary of analyses already reported is assembled in Table I.

Table I

(*Averages of multiple analyses are reported upon dry basis*)

Source	% Al.	% Dye acid radical
$NaX + AlCl_3 . 6 H_2O$	2.88	97.05
$NaX + 2AlCl_3 . 6 H_2O$	2.91	96.33
$2NaX + AlCl_3 . 6 H_2O$	2.77	97.48
$HX + 2AlCl_3 . 6 H_2O$	2.67	97.42
$1.5HX + AlCl_3 . 6 H_2O$	2.66	97.15
$HX + Al(OH)_3$	2.74	97.20
Recryst. from H_2O	2.54	97.45
Recryst. from C_2H_5OH	2.66	97.36
Theoretical for AlX_3	2.67	97.33

Ferric Iron

The study was then extended to the reaction of the dye and the dye acid with ferric salts and with hydrous ferric oxide gel[5]. Several complications were encountered in these experiments.

A clue to the first difficulty to be surmounted is found in the previously cited paper by Sisley[3]. This investigator prepared the ferrous and other salts of the dye acid but stated that the ferric salt does not exist. Action of the dye or its acid results in the reduction of the ferric ion, accompanied by the decomposition of the dye radical with the evolution of N_2 and of a strong odor of B-naphtho quinone—the process resulting in the precipitation of the ferrous salt of the dye acid.

Sisley does not describe the conditions under which this experiment was carried out nor does he offer any analyses in substantiation of the composition assigned to the precipitate. It seems, however, that his general procedure for the preparation of salts of the dye acid was to add a solution of a metallic chloride or sulfate to a boiling solution of the acid and to allow the less soluble metal-dye salt to crystallize from solution on cooling.

Under these conditions unmistakable evidence of the decomposition of the dye was found. However, $TiCl_3$ titrations of known mixtures of ferric sulfate solution and dye acid solution which had been boiled for varying lengths of time showed that the mutual destruction of the ferric ion and the dye radical takes place but slowly, even at boiling temperatures. When ferric salt solutions were added to solutions of the dye acid at room temperatures there was no visible evidence of decomposition and no apparent odor. Subsequent titrations of mixtures which had been allowed to stand at room temperature for periods up to twenty-four hours indicated that this decomposition either does not take place in the cold or proceeds so slowly as to be negligible.

Since it seemed desirable to avoid the mutually destructive action of the ferric ion and the dye radical it was decided to carry out as many as possible of these reactions in the cold, which precluded the possibility of obtaining a crystalline product. Unfortunately, the precipitate obtained by adding $FeCl_3$ solution to a solution of dye or dye acid is much more finely divided than that which results when $AlCl_3$ is used, and it is, more-

*Presented before the Dye Div. of the American Chem. Soc. at the Indianapolis Meeting.

over, gelatinous in nature rather than pulverulent. Consequently its occlusive (or adsorptive) properties might be expected to be more marked. Furthermore, the iron-dye product appears to hydrolyze more readily when washed with cold water than does the aluminum product.

In effecting the interaction of the dye acid with hydrous ferric oxide it was, of course, impossible to proceed in the cold, for the product cannot be separated from the gel save by solution, filtration, and precipitation on cooling. Experiments conducted in the course of evolving a system of analysis for the dye in the presence of Fe^{+++} ion, however, demonstrated that the oxidation-reduction reaction between the dye and ferric iron proceeds rather slowly even at the boiling point. Nevertheless the preparation was made in such manner that the reactants were heated in the presence of each other for as short a time as possible.

Ferric chloride equivalent to one part as employed in previous preparations was dissolved in a small amount of water and precipitated with an excess of ammonium hydroxide. After boiling to remove excess ammonia, the precipitated hydrous ferric oxide was filtered out on a small Buchner funnel. Gel and paper were then added to one liter of boiling solution containing double the amount of the dye acid calculated as equivalent to the amount of Fe^{+++} taken. The mixture was thoroughly stirred and then filtered through a large Buchner filter. The filtrate was quickly chilled and the fine crystals which separated constituted the product.

Further preparations were made from $FeCl_3$ and the dye and free dye acid, respectively, in solution media of various degrees of acidity and in both hot and cold. Analytical data are summarized in Table II.

TABLE II

Summary of average analyses on multiple samples

Reactants (Mol ratios)	Solution Medium	Ionic Ratio of Product Fe : X
$2FeCl_3 + 3NaX$	1 l. H_2O (cold)	1 : 1.89
$1FeCl_3 + 6NaX$	1 l. H_2O (cold)	1 : 2.08
$2FeCl_3 + 3NaX$	1 l. 0.1 N HCl (cold)	1 : 3.41
$1FeCl_3 + 6NaX$	1 l. 0.1 N HCl (cold)	1 : 3.53
$2FeCl_3 + 3NaX$	2 l. 0.05 N HCl (cold)	1 : 2.80
$1FeCl_3 + 6NaX$	2 l. 0.05 N HCl (cold)	1 : 2.94
$2FeCl_3 + 3HX$	1 l. H_2O (cold)	1 : 2.70
$1FeCl_3 + 3HX$	1 l. H_2O (cold)	1 : 2.86
$1FeCl_3 + 4.5HX$	1 l. H_2O (cold)	1 : 3.00
$2FeCl_3 + 3HX$	1 l. H_2O (hot)	1 : 1.21
$1FeCl_3 + 4.5HX$	1 l. H_2O (hot)	1 : 1.27
$1Fe(OH)_3 + 6HX$	1 l. H_2O (hot)	1 : 1.95

The results thus far obtained seemed capable of rational interpretation, but it was deemed desirable to supplement them before drawing conclusions. Two further preparations were made by adding the desired quantity of ferric compound to one liter of boiling dye acid solution, filtering immediately, dividing each filtrate into two portions (A and B), and then chilling each portion as quickly as possible. In the cases of portions A the precipitates which resulted from chilling were immediately isolated for analysis. Portions B were allowed to stand at room temperature for a week. Both were electrically stirred throughout that time, at the end of which the products were isolated for analysis. Results are summarized below:

TABLE III

Reactants		Ionic Ratio of Product Fe : X
$1\ FeCl_3 + 4.5\ HX$	(A	1 : 1.27
	(B	1 : 1.26
$1\ Fe(OH)_3 + 6\ HX$	(A	1 : 2.00
	(B	1 : 4.09

DISCUSSION OF FERRIC PRODUCTS

The following conclusions are not advanced as definitely proved in all particulars. They are, however, consistent with the date recorded and with known chemical phenomena.

To begin with, there can be no doubt that the products investigated result from true chemical interactions. All of the preparations described were made in acid media*, hence there is no question of initial $Fe(OH)_3$ precipitation. The precipitates are all copious and immediate—not at all of the character which could result from "slow hydrolysis" of dilute ferric solutions. If $Fe(OH)_3$ is precipitated at all, the precipitation must result from hydrolysis of the product initially formed.

The products reported here are probably nearly all mixtures of two or more compounds which may be designated for convenience as: FeX_3, $Fe(OH)X_2$, $Fe(OH)_2X$, $Fe(OH)_3$, and $FeX_3.nHX$. The composition of the product obtained depends upon the actual and relative concentrations of the reactants, the acidity of the reaction medium, and the temperature. These factors all operate as might be predicted from the known principles of hydrolysis.

The high ratios recorded in Table II might be attributed to adsorption of dye acid by the apparently amorphous product but such an explanation could not account for the composition of the B portion of the $Fe(OH)_3HX$ product recorded in Table III, for the initial product which was allowed to stand in the presence of the mother liquor was crystalline. Hence the rather indefinite hypothetical compound, $FeX_3.n\ HX$, is listed as a probable product. The formation of a product of this nature would seem to be favored both by high acidity of the reaction medium and by a high absolute and relative X-ion concentration. As a matter of fact this supposed compound might equally well be repre-

*This holds true even for the $FeCl_3$-NaX interaction. NaX solutions are neutral or faintly acid. Repeated pH determinations of 0.01 N NaX solutions gave pH values of the order of 6.5. The ferric chloride used also contained some free HCl.

sented as a neutral salt containing a complex ferric-dye ion. Iron is noted for its tendency to form complexes with organic ions.

Apparently hydrolysis of the normal salt increases rapidly with rise in temperature even though solubility also increases markedly. Subsequent cooling apparently results in precipitation of a basic salt or mixture of basic salts before the normal salt has a chance to form.

One may well inquire why a product with the ionic ratio, Fe:X = 1:2.00, formed in the hot, should increase its ratio to Fe: = 1:4.09 when allowed to stand in the presence of the mother liquor in the cold, when a similar product with a ratio of Fe:X = 1:1.27 does not alter within the limits of analytical error under the same treatment. In the opinion of the present writers the most plausible explanation is as follows:

Explanation of Ratio Increase

In the first place one must take into consideration the fact that the mother liquor in the former case is more acid and much more concentrated in dye ion than the mother liquor in the latter case. When $Fe(OH)_3$ is treated with dye acid solution in the manner previously described only a very small portion of the iron present reacts. Most of it is removed in the initial filtration. The filtrate from which the product separates on cooling contains most of the dye acid originally present, but only a small quantity of iron. The conditions are favorable, therefore, for the formation of a compound containing an abnormal proportion of dye-ion when the system is allowed to stand in the cold.

In the case of the $FeCl_3$ — HX product the respective concentrations of Fe and dye ions in the system are substantially those of the original reactants, which are just about correct for the formation of normal FeX_3. The normal salt is, itself, so insoluble, however, that it either does not form from the basic product in the cold or it forms an insoluble, adherent coating over the basic particles and the reaction speedily comes to a stop.

The acid or complex salt is either more soluble or it forms a loosely adherent coating which is removed by the agitation of stirring, allowing the reaction to proceed.

It is quite possible that the product reported as FeX_3 by Marker and Gordon[1] was a product containing an excess of X, for the method of analysis employed by them would almost inevitably have given a result somewhat too low for X-ion.

There can be no doubt that Sisley[3] was mistaken in asserting that the ferrous salt is precipitated when ferric chloride or sulfate is added to NaX solution. He must have obtained a product approximating $Fe(OH)X_2$ in composition—which would have given an Fe:X ratio very close to that calculated for FeX_2.

Chromic Products

There is no oxidation-reduction interaction between the chromic ion and the dye ion, hence preparation in the hot involves no complications other than that of hydrolysis. Samples prepared from $CrCl_3$ and dye and dye acid, respectively, gave the results shown in Table IV.

Table IV

Reactants (Mol ratios)	Product (ionic ratio, Cr:X)
2 $CrCl_3$ + NaX (cold)	1:2.39
2 $CrCl_3$ + NaX (hot)	1:2.72
$CrCl_3$ + 2NaX (cold)	1:1.92
$CrCl_3$ + 2NaX (hot)	1:1.54
2 $CrCl_3$ + HX (hot)	1:2.80
$CrCl_3$ + 1.5HX (hot)	1:2.90

Here it seems that when $CrCl_3$ is in equivalent excess, the excess $CrCl_3$ hydrolyzes in hot solution, increasing the acidity of the reaction medium and raising the Cr:X ratio of the product. When the dye is in excess all the chromium is precipitated and this effect cannot take place, so that heating results only in hydrolysis of the product with consequently lower Cr:X ration.

Experiment showed that washing of product with *cold* water causes no appreciable hydrolysis even when carried on unintermittently for 24 hours. The effect of temperature upon hydrolysis is illustrated by analyses of products obtained in fractional crystallization.

Reactants	Temperature Range	Product (ionic ratio) Cr:X
2 $CrCl_3$ + NaX	100°—70°C.	1:2.51
	70°—40°C.	1:2.86
	40°— 0°C.	no crystallization

Variations in the compositions of products obtained under duplicate conditions, but where the time of heating had not been rigidly controlled led us to believe that an appreciable time might be required for the attainment of hydrolytic equilibrium. Accordingly two proportions were made and maintained in boiling solution, small samples being removed at intervals and cooled for pH measurement with a quinhydrone electrode. Results obtained are reported in Table V.

Table V

(2$CrCl_3$ + 1NaX)	pH
Before adding $CrCl_3$	7.73
Just after adding $CrCl_3$	2.63
5 minutes after adding $CrCl_3$	2.15
10 minutes after adding $CrCl_3$	2.03
15 minutes after adding $CrCl_3$	1.97
20 minutes after adding $CrCl_3$	1.93
25 minutes after adding $CrCl_3$	1.93
35 minutes after adding $CrCl_3$	1.93
(1$CrCl_3$ + 2NaX)	pH
Before adding $CrCl_3$	7.53
Just after adding $CrCl_3$	3.18
5 minutes after adding $CrCl_3$	2.44
10 minutes after adding $CrCl_3$	2.38
15 minutes after adding $CrCl_3$	2.34
20 minutes after adding $CrCl_3$	2.32
25 minutes after adding $CrCl_3$	2.29
30 minutes after adding $CrCl_3$	2.29

The results confirmed our suspicion concerning time of equilibrium attainment and further supported our postulate concerning the effect of excess $CrCl_3$ upon the composition of products obtained in the hot.

To investigate the relationship between composition of product and acidity of reaction medium we prepared a considerable quantity of product from the dye and chromic chloride with the reactants in the ratio of $2CrCl_3$: 1NaX. Portions of this product were placed in filters and partially dissolved by pouring through hot solutions of HCl of varying concentration. Results are summarized in Table VI.

TABLE VI

pH wash solution	pH mother liquor	Product (ionic ratio, Cr:X)
.98	1.07	1:3.01
1.04	1.02	1:2.95
1.25	1.18	1:3.04
1.46	1.41	1:3.04
1.84	1.80	1:2.98
2.04	....	1:2.94
1.70	1.64	1:2.80
1.78	1.73	1:2.95
1.96	1.91	1:2.89
2.67	2.48	1:2.96
3.00	2.72	1:2.95
3.44	2.76	1:2.90

It appears that a pH of about 1.80 or slightly lower is necessary to check hydrolysis and give a normal salt.

OTHER PRODUCTS

Sisley[3] had already reported the preparation of the following salts of the free acid of Orange II: calcium, magnesium, ferrous, and aniline.

Others were prepared by us by a method analogous to that employed by Sisley—i. e., the metal salt was dissolved in a relatively small quantity of water and added to a boiling solution of dye acid. Heating was continued for a few minutes and the precipitate was then filtered off and air-dried for analysis. Table VII summarizes these experiments.

TABLE VII

Dye Acid Solution g. HX	cc.H_2O	g. Metal Metal Solution	cc.H_2O	Product Me:X) (avge. ratio,
10	1000	4.2 g.$ZnCl_2$	100	1:2.01
10	1000	3.1 g.$BaCl_2.2H_2O$	200	1:2.09
10	1000	4.0 g.$AgNO_3$	100	1:1.14
10	500	4.5 g.$CuCl_2.2H_2O$	100	1:2.04
12	500	10 g.$PbCl_2$	400	1:2.03
10	800	Sat. $Hg(NO_3)_2$	200	1:2.01
10	1000	4.0 g.$CoCl_2$	100	1:2.05
10	500	3.7 g.$NiCl_2$	100	1:2.05

The approximate solubilities of these compounds were determined by titrating with $TiCl_3$ a measured volume of the saturated solution.

Solubility in grams of MX in 100 cc. of water

Compound	0°-10°	25°-30°	90°-100°
ZnX_2	.015	.019	.31
BaX_2	.05	.07	.10
AgX	.14	.15	.74
CuX_2	.06	.08	.80
PbX_2	.015	.025	.08
HgX_2	.15	.15	(hydrolizes)
CoX_2	.01	.015	.14
NiX_2	.03	.035	.19

METHODS OF ANALYSIS

Except in the case of the ferric products the methods of analysis was a slight modification of that prescribed by Knecht and Hibbert[6] for Orange II. The deviation consisted in the fact that individual samples of 0.1 g. were analyzed instead of aliquot parts from a solution of one sample.

Ferric products were analyzed as follows:[5] A 0.1 gram sample of the finely ground ferric-dye product is brushed into a 250-cc. Erlenmeyer titration flask. Fifty cubic centimeters of ethyl alcohol and 10 cc. of concentrated HCl are added.† The flask is then closed with a three-hole rubber stopper‡ and swept out with CO_2. A stream of CO_2 is maintained through the flask from this point onward. An excess of standardized $TiCl_3$ solution is then run into the flask. It is highly important that the sample be totally dissolved at this point. Some time may be lost in effecting complete solution, but impatience will result only in the ruin of the determination.§ The flask is then detached from the $TiCl_3$ buret and transferred to a hot plate or an asbestos pad over a small gas flame, where it is allowed to remain until the color of the dye is totally destroyed and only the faint purplish tinge of excess $TiCl_3$ remains. (This usually involves gently simmering the titration solution for several minutes.) The flask is then carefully cooled under the tap and 10 cc. of 10% KSCN solution is introduced through a hole in the stopper by means of a pipet. A back titration is then performed, using standard ferric sulfate solution containing about 3.639 grams Fe^{+++} per liter.‖ The end-point is indicated when a faint but permanent orange-brown tint is attained. This titration is best performed by daylight.

The reliability of the procedure described was tested by titrating mixtures made up of known volumes of standard ferric and dye acid solutions which had been separately boiled to remove oxygen and cooled.

It is, of course, obvious that the net titer obtained in

†The ethyl alcohol is previously distilled from $TiCl_3$ solution. Just before the determinations are to be made the alcohol and the HCl are both boiled for about twenty minutes and cooled under the tap in stoppered flasks.

‡One hole is provided for the CO_2 inlet tube, one fits the buret, and the third serves for the escape of excess CO_2.

§$TiCl_3$ reduces Fe^{***} in the cold, but it can do so only if the iron is in solution. It is essential that all Fe^{***} be removed before the titration mixture is heated.

‖One cubic centimeter of ferric solution of this concentration is equivalent to about 2.5 cc. of the standard $TiCl_3$ solution. This is unfortunate, but the indicator does not operate satisfactorily in the volume of titration solution present if a more dilute ferric solution is employed.

the procedure outlined for iron-dye products represents the summation of the Fe^{+++} and the dye ion contents. The actual dye ion content must be obtained by difference after the execution of an independent Fe^{+++} determination.

Fe^{+++} was determined by ignition of the product in a platinum crucible at low red heat with subsequent solution in concentrated HCl, insurance of complete oxidation by means of Br_2 and titration with $FeCl_3$.

Aluminum was determined by ignition to Al_2O_3.

Zinc was determined by ignition to the oxide.

Barium was dissolved in HCl, precipitated and determined as sulfate.

Lead (1 g. sample): The sample was placed in a Kjeldahl flask, 10 cc. of concentrated H_2SO_4 added, and the flask heated to incipient charring. When cool, 5 cc. of fuming nitric acid (more used if necessary) was added and heating resumed until the solution had become colorless. Heating was continued until fumes of SO_3 appeared. The sides of the flask were then washed down with a little water, and the solution again evaporated to white fumes. This concentrate was diluted to 15 volumes and filtered through a tarred Gooch crucible. The precipitate was washed with dilute H_2SO_4 and once with alcohol. The crucible was then placed in the oven at 100° and ignited at dull red heat. It was weighed as $PbSO_4$.

Copper (.5 g. sample): The organic matter was burned off and the residue dissolved in 15 cc. of dilute nitric acid, first allowing the sample to stand in a warm place for about 15 minutes, and then heating. To the boiling solution was added, drop by drop, a solution of KOH until a permanent dark brown precipitate was obtained. The precipitate was washed by decantation, transferred to a Gooch crucible, and washed free of alkali. The precipitate was ignited gently at first and finally with the full Bunsen flame. It was weighed as CuO.

Silver (.5 g. sample): The organic matter was burned off, and the silver residue dissolved in nitric acid and precipitated as the chloride.[7]

Mercury (.5 g. sample): The sample was digested in a Kjeldahl flask as was the lead compound. The solution was diluted and saturated with H_2S, and the precipitate filtered off in a Gooch crucible. The H_2S was freed from the co-precipitated sulphur by extraction with CS_2[8], the CS_2 being later removed by washing once with alcohol and once with ether. The crucible was dried at 110°, and the Hg weighed as HgS.

Cobalt (.5 g. sample): The sample was ignited to the oxide and the residue dissolved by warming in 10 cc. of 6N. HCl. The solution was transferred to a lipless beaker, and 1g. of NH_4Cl, 1g. of $NaC_2H_3O_2$, and 8 cc. concentrated NH_4OH were added. The solution was diluted to 150 cc. and electrolized between platinum gauze electrodes, using 3 volts and 1 ampere.

Nickel (.5 g. sample): The sample was ignited to the oxide, which was dissolved in the minimum amount of HNO_3, plus 20 cc. of H_2SO_4 (1:1). The solution was evaporated until SO_2 evolved, diluted, and Ni precipitated by dimethyl glyoxime.[6]

Summary

The free acid of Orange II behaves as a fairly strong monovalent acid. In supposed adsorption studies in which Orange II is brought into contact with amphoteric gels in acid media, it is necessary to bear in mind the probability of chemical interaction.

Further studies now in progress are designed to extend our knowledge to include interaction of dye, mordant and fibre, by means of X-ray diffraction of pattern studies.

Literature Cited

[1] Marker and Gordon, *Ind. Eng. Chem., 16,* 1186 (1924).
[2] Weiser, H. B., and Porter, E. E., *J. Phys. Chem., 31,* 1704 (1927). See also H. B. Weiser and E. E. Porter, "Colloid Symposium Monograph," Vol. V, *1928,* p. 369, and H. B. Weiser, "A Survey of American Chemistry," Vol. III, *1928,* pp. 43-44.
[3] Sisley, *Bull. Soc. Chem.,* [3], 25, 862, (1910).
[4] Reinmuth and Gordon, Colloid Symposium Annual, VII (1930).
[5] Reinmuth, *Dissertation,* University of Maryland, 1930.
[6] "New Reduction Methods in Volumetric Analysis," Longmans, Green & Co., New York City, *1918,* p. 76.
[7] Treadwell-Hall, "Analytical Chemistry—Quantitative" Ed.
[8] *Ibid.*

Cotton Industry Can Help Themselves

Such was the assertion of H. F. Johnson of the New Uses Department of the Cotton Textile Institute in an address before the New York Chapter of the Lowell Textile Institute at a meeting held on September 28th at the Happiness Restaurant. One instance he gave in which they might help themselves was in the use of cotton bags for bailing cotton rather than those of burlap. He stated that buyers were willing to pay a higher price for cotton baled in cotton than that which was bound with burlap. He mentioned many new uses which had been found for cotton by the Institute with the cooperation of other parts of the industry. Among those of which he spoke and exhibited samples were cotton belting, cotton bagging, cotton arm covers for traffic officers, cotton covering for dirigibles, drapings for art galleries, fire proof awnings, cotton cartridge bag cloth, cotton duck as a substitute for stucco in covering houses, lithographed cotton display banners, and gear wheels of cotton and rosin compounds. In the covering of the Akron 36,000 yards of type HH balloon cloth was used.

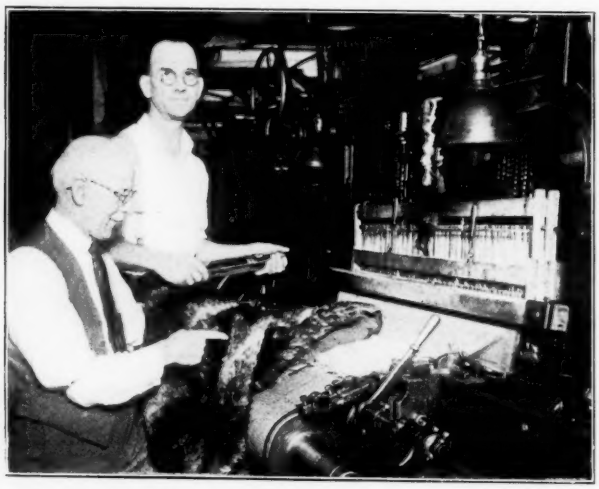
In his closing remarks he urged the cooperation of all sections of the industry for the solutions of further problems.

The meeting was presided over by Adolph J. Winkler. Plans were discussed for the coming football game with Long Island University on Oct. 17th. Tickets may be obtained from Adolph J. Winkler, 40 Worth St., or from Louis Zisman of the Gotham Silk Hosiery Co.

At the request of our readers who have attended Lowell Textile Institute we print herewith the schedule for the remainder of the season: Oct. 17—Long Island U. at Brooklyn; Oct. 24—Open, Oct. 31—Providence at Lowell; Nov. 7—Seton Hall at Lowell; Nov. 14—Upsala at Lowell.

Man-Made Fur

At the Sanford Mills, Sanford, Me., looms have been developed by Herbert J. Hope, veteran loom designer, that reassemble shorn Angora hair (mohair) in its naturally erect position, intermingling both long and short hairs, on a fabric base—creating an animal fibre "fur" surfaced fabric for the first time without killing the animal and utilizing the skin base.



Herbert J. Hope (left) inventor of "man-made fur," and Victor McFarland, first operator of "fur" machine.

The new "fur" is called Koongora because it looks like coonskin and is made of the Angora hair.

The dyed effects in the fabric are obtained by using dyed yarn as a base with a hand block printed surface.

X-Ray Analysis Now Part of Electrical Manufacturing

Hidden defects in castings, welds and electric machinery, hither too difficult or impossible to detect visually or by ordinary methods, are now revealed by the spotlight of the X-ray in the largest laboratory of its kind in industry, recently added to the manufacturing facilities of the General Electric plant in Schenectady. This laboratory is completely equipped with a sub-station, rooms for taking X-ray pictures, photographic darkroom and air conditioning plant.

A 200,000-volt X-ray tube is used, the highest voltage rating commercially available, the equipment being the standard hospital deep therapy type built and installed by the General Electric X-ray Corporation. Products varying in size from very small devices to castings weighing many tons can be photographed. Two rooms are provided for this purpose, one about 11 feet square by 9 feet in height for the small equipment, and the other 24 by 26 by 17 feet high, approximate dimensions, for large castings and machines.

"Winter Damage" to Cotton Goods

When laundered cotton fabrics are dried out of doors in winter in New England, they frequently undergo excessive deterioration of a type called "winter damage." A research paper, No. 294 of the U. S. Bureau of Standards, is concerned with an investigation of the causes of "winter damage," and with its prevention.

Analyses of damaged fabrics and experimental work in the laundries and in the laboratory showed that the damage is caused by sulphuric acid which is formed in the damp fabric by the oxidation of atmospheric sulphur dioxide. The oxidation is accelerated, and the damage is increased by small amounts of certain substances which may occur in laundered fabrics. Traces of iron, of spent bleach liquor, and of acetic acid were found to have this effect.

A small amount of calcium bicarbonate in the final rinse-water of the wash materially reduced the damage, and is recommended as a satisfactory remedy.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED

DYER—Six years' experience at bleaching and dyeing wool, cotton, jute and union raw stocks and yarns. Thoroughly experienced in all stages of carpet manufacture. Age, 26; married. Address: Classified Box No. 692, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED

Man fully experienced in color matching, Dyetesting and Standardization by a Dyestuff Manufacturing Co. Should be familiar with the different classes of Dyestuffs and their application to miscellaneous fibres. A day graduate of a recognized textile school is preferred. Give full details as to experience, reference, alary expected, etc. Reply to Box 698, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

POSITION WANTED

Textile Chemist and Dyer, 20 years' experience in technical, laboratory and practical bleaching and dyeing of rayon knit, cotton, rayon and silk mixtures, pure silk and weighted pieces, worsted knit and rayon mixtures. Address Box 699, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

COLORIST

Available immediately to take charge of Color Department or Shading. Have been for the past two years in charge of the Color Dept. in an Eastern Print Works. Experienced in all classes of colors particularly in Vats and Naphthols. Capable of running Color Department at low cost. Apply Box No. 700, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.